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Subscriptions:	0625 879940
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Prestel Mailbox:	614568383

Published by:
Database Publications Ltd,
Europa House, Adlington Park,
Adlington, Macclesfield SK10 4NP.

ISSN 0952-5948

Amiga Computing welcomes articles for publication. Material should be typed or computer-printed, and preferably double-spaced. Program listings should be accompanied by disc. Please enclose a stamped, self-addressed envelope, otherwise the return of material cannot be guaranteed. Contributions can only be accepted for publication by Database Publications Ltd on an all-rights basis.

News trade distribution: Europress Sales and Distribution Limited, Unit 1, Burgess Road, Ivyhouse Lane, Hastings, East Sussex TN35 4NR. Tel: 0424 430422.

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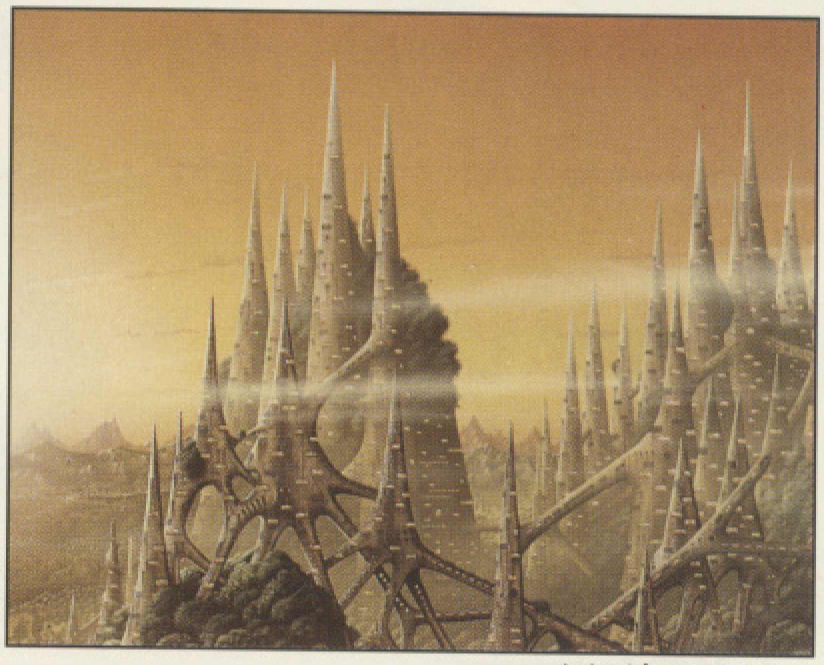
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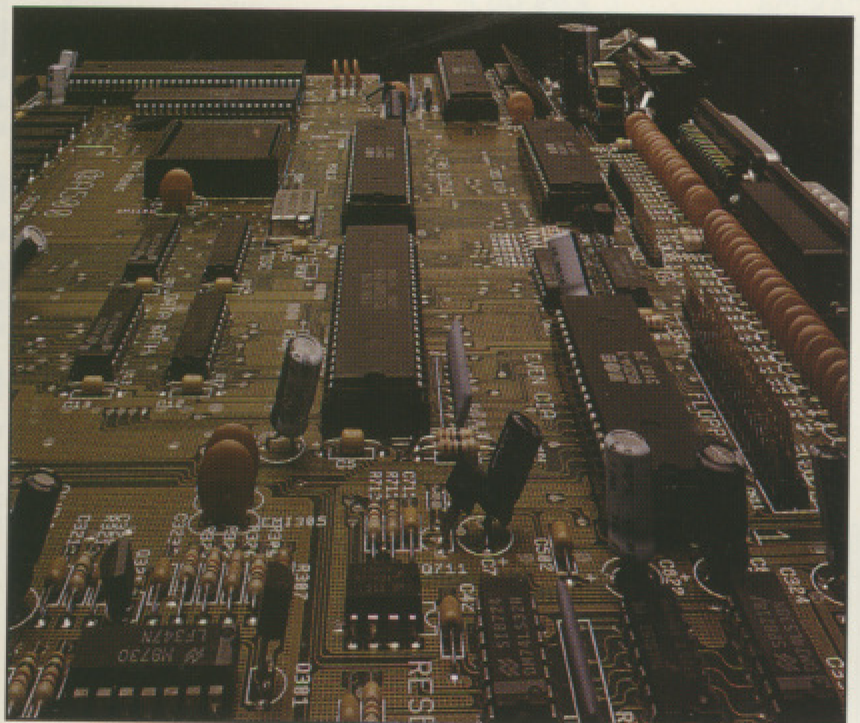
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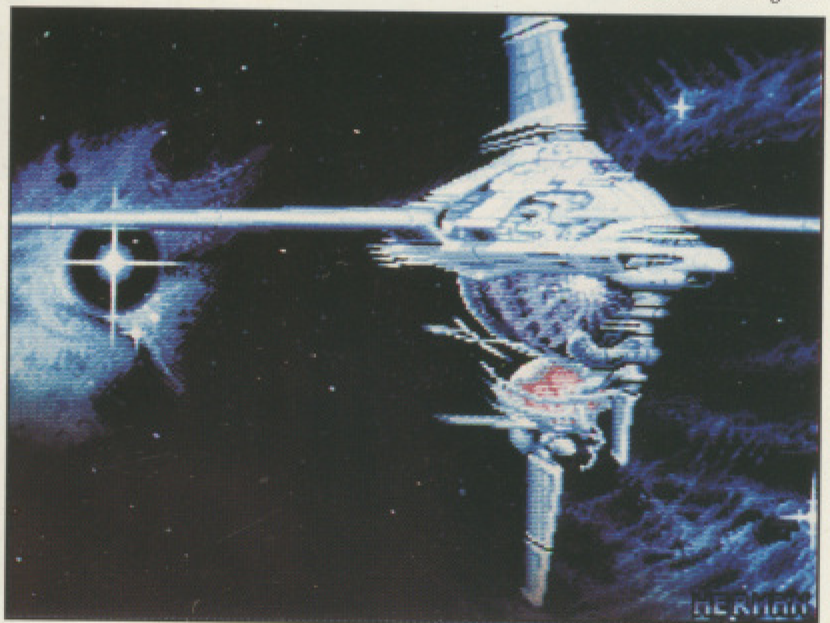
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Into the silicon underworld Page 52



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AMIGA SCENE

Hard sell for Amiga

THE Amiga will feature strongly in Commodore's multi-million pound autumn advertising campaign.

Although a large slice of the £5 million spend will go on promoting a restructured PC range, the Amiga has been picked out for special attention.

According to Commodore spokesman Tim Rafferty there will be a "very aggressive advertising campaign in newspapers and magazines, with TV exposure nearer Christmas.

"The Amiga presentations will focus on its roles as a home and business machine – and also the solutions it offers vertical markets, particularly CAD, with its graphics", he said.

Marketing manager Dean Barratt adds: "The machines' music, speech and colour capabilities lend themselves well to television.

"Once the Amiga has been on TV there will be a greater acceptance of its ease of use".

Hart leaves Commodore

AFTER 10 years with Commodore, operations director Tom Hart has left to work for the Unisys Corporation.

"It's sad to leave a company such as Commodore, yet I'm looking forward to a new challenge", said Hart.

"I find myself able to take this career decision at this time because of, not despite, Commodore's strong current position.

"Present strength of the senior and middle management in the UK and elsewhere leaves me confident of Commodore's success".

Jim Housego will now head the operations division, with managing director Steve Franklin taking on responsibility for sales.

AMERICA WAVES THE FLAG AT WINDY CITY SHOW

AmiExpo is the top US show for Amiga owners. SIMON ROCKMAN reports direct from Chicago

AMERICA's windy city stayed calm for AmiExpo, a mecca for Amiga enthusiasts throughout the Mid-West.

Commodore had a good-sized exhibit but kept things quite low key.

The only new product shown was the A2024 monitor with its 1008 by 800 four level grey resolution: British A2024s will offer 1008 by 1024. It looked great. There was no sign of the A590 hard drive. It might just appear before Christmas,

Few new releases then, but Commodore's Jeff Parker did talk about the possibility of building an Amiga-based games console. And RJ Mical was on hand to clear up one point: "Everyone at Amiga knows that the machine was really designed by Michy – Jay Miner's dog", he said. "And the paw print inside an Amiga 1000 goes to prove it".

Infinity was showing Shakespeare on an A2024 and Dale Luck had one on a borrowed area of the Byte by Byte stand, showing X-windows for the AmigaDos. X-windows is an international standard environment agreed on by all the major manufacturers, including IBM.

Another new product on the Byte by Byte stand was Fancy Fonts 3D, which will be reviewed in *Amiga Computing* shortly. Karl Krammer is enthusiastic about the product's capabilities: "The new Fancy Fonts 3D designs for Sculpt are intended for maximum rendering speed", he said.

A-Squared had news of a PAL version for Live! its popular A500 digitiser. Arthur Abraham of A-Squared is keen to produce an A2000 card, but feels that the UK market would not merit a full blown production run.

Actionware was waving the flag – or more accurately the gun – for funsters. Two titles,



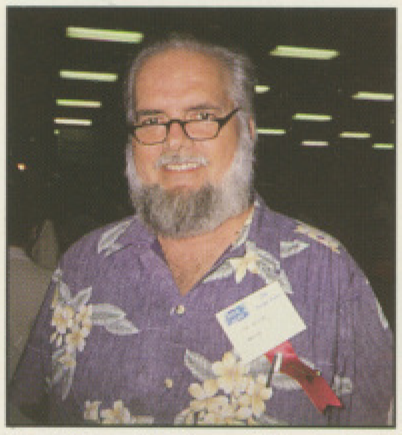
The name of the game is shoot Capone

POW and Capone, both work with light guns and the result is games much like the current arcade smash Operation Wolf.

Most of the games on display were German, with Readysoft showing Ganymede – an Attack of the Mutant Camels clone – and Bomb Busters, a game which looks a lot like Bomb Jack and a very early version of Dragon's lair. Based on the coin-op, it has a Gauntlet-like scene running from room to room. The final program will occupy six discs – that's more than 5Mb – and cost $40.

Comms was much better represented, with both AmiNet and PeopleLink having stands.

Unapproved modems were incredibly cheap. Standalone 2400 baud models were being sold for $143 (£83) – a third of the UK price. More expensive modems were on sale at the Amic developments stand, bundled with AMIC Term 1.0, a communications program intended to make online time more efficient.



Jay Miner, "Father of the Amiga"

It's always good to see a friendly face when you're away from home, so bumping into Anil Gupta from Anco and Ken Browning from Eidersoft was a pleasure. Ken was demonstrating the Gold version of Eidersoft's programs for its sound sampler, while Anco showed its selection of European games.

Many serious users will know about ASDG, a company which produces a wide range of peripherals. Its first software product – a powerful text processor called CygnusEd Professional – was released at the show and critics described it as stunningly good.

The latest hardware gizmo from ASDG was also unveiled. The Twin-X board, especially designed for control applications, has an IEEE ▶

Ban on software hits trade hard

GREGOR NEUMANN
Reporting from West Germany

AT the moment the most controversial topic in Germany – and certainly the one most frequently discussed by computer users – is the banning of software.

The German government can ban any media – books, films, videos or whatever – if they appear to be unsuitable for children. The laws are intended to protect German youth from the effects of pornography and violence.

Adults may buy such material, but only in shops that have a special area set aside that children under 18 aren't allowed to enter.

No one objected to the banning of pornographic or horror videos. But emotions were aroused when, about two years ago, the government started banning software. It was hard to understand why software should be treated in the same way as videos or books.

The Office for the Protection of the Young is responsible for the vetting of all media. And despite no experience of computer games, it has so far banned 70 games. The black list contains simulations such as Gunship and even normal shoot-'em-ups like 1942.

The problem is that nobody – neither teachers nor programmers – knows what makes a computer game harmful for children. Is every action game a danger for the young? Can you ban a simulation for being too realistic? There don't seem to be any exact guidelines for the treatment of software.

The banning has important effects on the German software scene. Dealers, for example, are confused because they don't know whether they are allowed to sell banned games. In Munich there is not a single shop which offers a special room for banned software – they simply stop selling it.

To complete the chaos, computer magazines are not allowed to tell their readers which new programs are banned. The government says that would be advertising for these games, and advertising is strongly forbidden. As you can imagine, there is a lot of confusion over here.

Besides the banning issue, German Amiga users are talking about GFA-Basic for the Amiga, which was first shown at the CeBIT at Hanover in March. The small German software house called GFA set the standard for Basic on the Atari ST, and GFA-Basic is very popular because it is amazingly fast.

Many commands are reminiscent of Pascal, others of assembler language . With GFA-Basic it is easy to work with windows and pull-down menus. The Amiga version will have the same advantages and extra abilities, such as better graphics and more commands for sound programming.

It will also be compatible with the ST version, so most of the many ST programs, written in GFA-Basic, will run on the Amiga. That is just one of the reasons why so many people are waiting for it.



Flickering facts

MICROWAY has described reports that its popular FlickerFixer board (reviewed last month) will be made available for the Amiga 500 as "a trifle early".

The company does have a bench prototype of such a device, but no decision has been made regarding whether to go into production. The indiscretion which revealed the A500 FlickerFixer was committed by a company accountant. A source within the company said "If he keeps his nose out of R and D I'll keep mine out of his books".

Even if the decision is made to go ahead with the A500 board it will be expensive and require a full MultiSync monitor: Even cut down monitors like those supplied with the Amstrad PC will not work.

Meanwhile the A2000 FlickerFixer is going from strength to strength: Commodore US now uses the boards in all its demonstration machines.

Ingrid's Back



A SEQUEL to its hit adventure Gnome Ranger will be released next month by Level 9 Computing (0344 487597).

Gnome II sees Ingrid Bottomlow return to Little Moaning in order to prevent Jasper Quickbuck from turning the village into a yuppie paradise.

Price £19.95.

Enter Hewson

ANOTHER major publisher has entered the Amiga market. Hewson (0235 832939) has released four titles – two brand new and the others conversions of recent 8 bit hits.

Netherworld, Planet of Purgatory is locked in eternal conflict between the forces of good and evil.

Diamonds are the key to survival, but before they can be obtained the player must defeat the denizens of Netherworld.

Cybernoid II features attack weapons including yo-yo bombs, terrain-following missiles and a fire and retrieve boomerang blaster.

Hewson has also rewritten and converted the original Cybernoid space pirates hit, and the 1987 shoot-'em-up Zynaps. Price £19.99 each.

European discs deal

SPECIALIST distributor SJB Disks has won exclusive UK distribution rights for the new Commodore brand of 5.25in and 3.5in discs.

The discs – already obtainable in West Germany – are now available in the UK following an agreement between Commodore and RPS, one of only two fully integrated magnetic media manufacturers in Europe. RPS now supplies the whole of Commodore's European operation.

Commodore has extended the agreement as a result of the proof of product quality: "The evidence from our involvement in West Germany is impressive", said Dean Barratt, Commodore's UK marketing manager.

"And we are convinced that this agreement will guarantee the highest quality product for our users".

Dragonlance derivative

THE product would-be role playing Amiga users have been waiting for is on its way from US Gold (021-356 3388).

Heroes of the Lance – a version of the legendary Dragonlance epic – will be the first Amiga offering to emerge from a collaboration between US Gold and Strategic Simulations.

The partnership has promised a range of products over the next five years based on the popular advanced dungeons and dragons games system.

Heroes of the Lance is a first computer action game recreating the epic battle between good and evil on the world of Krynn.

The player controls eight companions, each with different specialised attributes and skills, and guides them deep into the treacherous ruins of the temple Xak Tsaroth to retrieve the precious Discs of Mishakal.

Descending into the Abyss, the companions must defeat the hordes of monstrous Draconians in hand-to-hand combat, deal with powerful magic and survive the onslaught of giant spiders, skeletal undead and other terrors.

Finally Kisanth, the fearsome black dragon must be confronted and destroyed if the quest is not to end in failure.

Into the wide blue yonder

ACADEMY has arrived on the Amiga, courtesy of CRL (01-533 2918). Would-be aviators have 20 missions to complete to prove they are worthy of being a pilot.

Blurbed as "incredibly addictive and playable", Academy does have a major saving grace in that players can save a game in progress.

Price £19.95.

More colour on the desktop

SHAKESPEARE, a colour DTP package for the Amiga family, from US-based Infinity, is now available in the UK from Cloudhall (0604 231211).

Recently upgraded to version 1.1, it allows integrated text and graphics, and supports a mix of multiple full colour DeluxePaint images and multiple colour palettes on a single page.



Shakespeare will output to PostScript devices, including the Apple Laserwriter Plus and Linotronic Imagesetters and will print on all graphics-capable Preferences supported printers.

Price £148.35.

Commodore to go PS/2

ENGINEERS at Commodore in Germany have decided that the IBM PS/2 Microchannel architecture is close enough to that of an Amiga 2000 to be simply implemented.

This means that in addition to the PC Bridgeboard and the forthcoming AT Bridgeboard there may well be a PS/2 board with VGA and Microchannel.

While the A2500UX is still not in production, a number of Commodore engineers are now using the Unix machines in preference to their much more expensive Sun workstations.

New at AmiExpo

959 bus and has already been put to use with the Sharp JX 450 scanner.

ASDG is working on some compaction, while Gold Disk is collaborating to produce desktop publishing software which will make the most of the hardware.

Gold Disk itself had a number of new products on display including Profes-



Dale Luck demonstrates X-Windows

sional Draw, a resolution independent art program.

Movie Magic is a superb looking cartoon program, designed to be used by young children who want to make their own TV-style cartoons.

Gold Disk was a little more secretive about a third new program. It is as yet unnamed, but company president Kailash Ambwani revealed that it is a 3D design program which will be available before the end of September. He also promised that the long-awaited Comic Setter would be finished shortly.

Brown-Wagh (pronounced Brown-Way) Publishing had its full range of software on show, with some very professional demonstrators using the company's productivity programs on a big screen and answering questions.

Brown-Wagh's stand dwarfed that of the neighbouring WordPerfect Corporation showing WordPerfect Library.

Creative Microsystems was selling a full Midi interface and – best of all – a 14Mhz board which doubles the clock speed of the Amiga.

C-Ltd, famed for hard discs, was showing its new laser printer and selling its unpopulated ram expansion boards with a clock for $40.

Great Valley products offers a wide range of peripherals, including a hard disc with up to 2Mb ram.

Marauder might be no more, but Discovery was showing Arkanoid, Zoom



The 14Mhz upgrade from CMI – A1000 model

and the VIP virus checker. Discovery's Nancy Picard said she was "really pleased with the way Arkenoid is selling in Europe", and more titles should be on the way soon.



This shows why the A2024 is still a prototype

Even "utility" collectors were catered for: Fuller had Project D available for anyone hell bent on "backing up" software, but on the whole the Americans seem to be much more civilised about piracy.

My favourite toy at the show – a pair of 3D glasses – was supplied by Haitex.

All in all an exciting show. But the real thrill of AmiExpo was seeing 15,000 people who enjoy their Amigas learning about and buying gear to make using their computers more fun.

The games scene worldwide

France

INDIAN Mission is a clone of Indiana Jones featuring each of the different stages of the original game. The graphics, as you would expect from a French release, are really excellently shaded.

The title tune and game effects are of an equally high standard and I'm sure it will prove a worthy successor to the popular ST version of Indiana Jones from US Gold.

The only other French release this month was 20,000 Leagues Sous La Mer. It features some of the most boring digitised sound I have ever heard. It goes on and on and on and the rest of the game does little to save face.

Britain

In Britain things are hotting up. Exocet will soon be releasing Phantasm, Bizarre 3, Star Burner and Hyperdrome. Bizarre 3 is an interesting twist on the platform theme, with almost 800 screens of slapstick action and strategic elements. Hyperdrome is a horizontal scrolling shoot-'em-up in the Nemesis mould.

Prism Software will be releasing Terroforce, Hot Shot, Addictaball, Who Dares Wins II, Zed, Rocket Roger, Battlestations and Artificial Dreams. Some of these are old Alligata hits from the 8 bit days.

Our editor spent many nights playing Rocket Roger, one of the most underrated games to grace the Commodore 64. Who Dares Wins II is an Ikari Warriors style game, while Terroforce is a scrolling shoot-'em-up on land, sea and air. The sound in was digitised using the Ediersoft Pro-Sound package recently reviewed in *Amiga Computing*.

Terroforce was written by Justin Gavinovic, who is now working on an Amiga version of The Krystal, a game which won't be ready for preview, let alone review, for a couple of months.

Be prepared for 1943 and Thunder Blade from US Gold and Operation Wolf from Ocean. Afterburner is being converted by the solid specialists, Argonaut Software. The game is set to be released around Christmas, although at the time of writing the project has only just started.

Argonaut's last offering, StarGlider II – reviewed this month – has been on sale in the US for a short while, with the European launch due soon. But there is no point in ordering a copy from the States to beat your friends as the American version won't work on British machines.

Palace Software, the company that used Maria Whittaker's considerable assets to advertise the hit game Barbarian, has been overwhelmed by the interest shown in an Amiga version – and has promised to support the Amiga with Barbarian II.

The game is bound to be banned in Germany, so Palace is gearing up to sell as many copies as possible before the axe desends.

Also in the pipeline are Starship – an ambitious vector graphic and spritey game – and Rimrunner, which appeared on the C64 a while ago. This will be jazzed up on all other formats by the addition of smart bombs, mines and a jumping dinosaur.

DIY games freaks should not miss Shoot-'em-up Construction Kit, now being Amigaised. Judging by Palace's previous track record, all titles should be excellent – and late.

Electronic Arts, another company usually associated with premium computer software, has not as yet made a significant impact in the European market. However that could all change very soon as the company unveils its latest American creations, which include SkyFox II and Skate or Die.

As well as relying on hot American games, EA's affiliated label Martech is also looking towards conversions of The Armageddon Man and Nigel Mansel's Grand Prix. From the US we will see a Crazy Golf game by Will "Marble Madness" Harvey. Written in his own games language, it promises to be something spécial.

The latest EA signing is Interplay, currently working on a Cyberpunk game called Battle Chess which is based on the award winning Neuromancer novel. Interplay is being helped with the project by Dr Timothy Leary, a spiritual leader of the sixties.

On the subject of original Amiga games, Aquaventura is the working title for Psygnosis' next release. A spokesman from the company suggested that this game was their best yet and made extensive use of the blitter for all the 3D routines.

Germany

There hasn't been much activity on the German front this month apart from the excellent Future Tank from Time Warp, the people who brought you Great Giana Sisters. The first loading screen is one of the best I have seen on any home micro and the rest of the graphics are also very good.

Future Tank is a Fire Power clone, but this time the two players work as a team fighting an enemy of tanks, boats and planes.

The game features some new twists including new levels and extra weapons.

If you like a fun game this is the one for you, especially if you have a friend to help you in your fight against evil.

America

The only new American release which springs to mind is P.O.W from Actionware, a clone of the arcade game Operation Wolf from Taito.

I liked Operation Wolf and I like P.O.W. My only complaint is the slow and slightly jerky scrolling, from which the company's previous release Capone also suffered.

Simon Rockman

ICPUG's new chairman

THE Independent Commodore Products Users Group – ICPUG – is celebrating 10 successful years.

Membership of more than 20 regional ICPUG groups tops the 4,000 mark.

But there were regrets as well as celebrations during the annual general meeting in London – the group's energetic American-born leader Lt Col Jim Kennedy said his farewells after two years as chairman.

He is retiring and taking his family to live on the Isle of Wight. But his vast experience won't be lost to ICPUG completely, as he'll continue to serve on the committee as the assistant exhibitions organiser.

Electrical engineer John Bickerstaff, vice-chairman and secretary for the past two years, takes Jim Kennedy's place as chairman.

He has been a member of ICPUG since 1980 when he became a founder member of the Canterbury Group, and chairman of the South East Group since 1985.

The ICPUG chief librarian, Joe Griffin, was elected vice-chairman, and optician Peter Reeve becomes the new secretary.

Ocean trio

THREE new titles for the Amiga have been announced by Ocean Software (061-832 6633). They are Army Moves, Platoon and Daly Thompson's Olympic Challenge. Price will be £24.99 each.

New links for Email

MICROLINK has just announced that Spain and Malta can now be accessed directly by its subscribers.

Compania Telefonica Nacional de Espana and Alpha Communications of Malta bring to 20 the number of Email systems available through the international Dialcom network.

ARE you handy with a mouse but a slow and painful typist? If so, then Mirrorsoft has all sorts of adventures for you. One set in the classic mould of dungeons and dragons is Shadowgate.

You may have to type in a few words when speaking to something or when naming a saved game, but for the rest it is all mouse controlled, dragging and clicking on a wide range of well drawn icons that enable you to do almost anything.

You start with very little useful information about the task ahead. All you know is that you are the last of a long line of ancient kings, and a prophecy foretells that the fate of the world is in your hands.

You must overcome the dreaded Warlock Lord and stop him from fulfilling his plan to destroy the world with his dark magic. The good wizard Lakmir is not able to give you any assistance other than transport you to the doors of Shadowgate.

Once a shining fortress, standing for all that was good and pure in the realm, Shadowgate has fallen under the Warlock's power. Here he will attempt his evil deeds. This is humanity's last chance; are you strong enough in mind and body to challenge his might?

Although distributed by Mirrorsoft, Shadowgate is a Mindscape production, programmed by ICOM Simulations. Originally written for the Apple, its implementation on the Amiga realises the full potential of the system.

The screen display consists of a number of windows, the largest being a representation of your present location. Alongside is an inventory window displaying all you are carrying as graphic icons. A smaller window to the right shows any visible exits.

A scrolling text display lies across the bottom of the screen and at the top is a box with the eight main commands: Examine, open, close, speak, operate, go, hit and consume. A pull-down menu enables you to select save/load game positions, together with quit or the option to begin the game again.

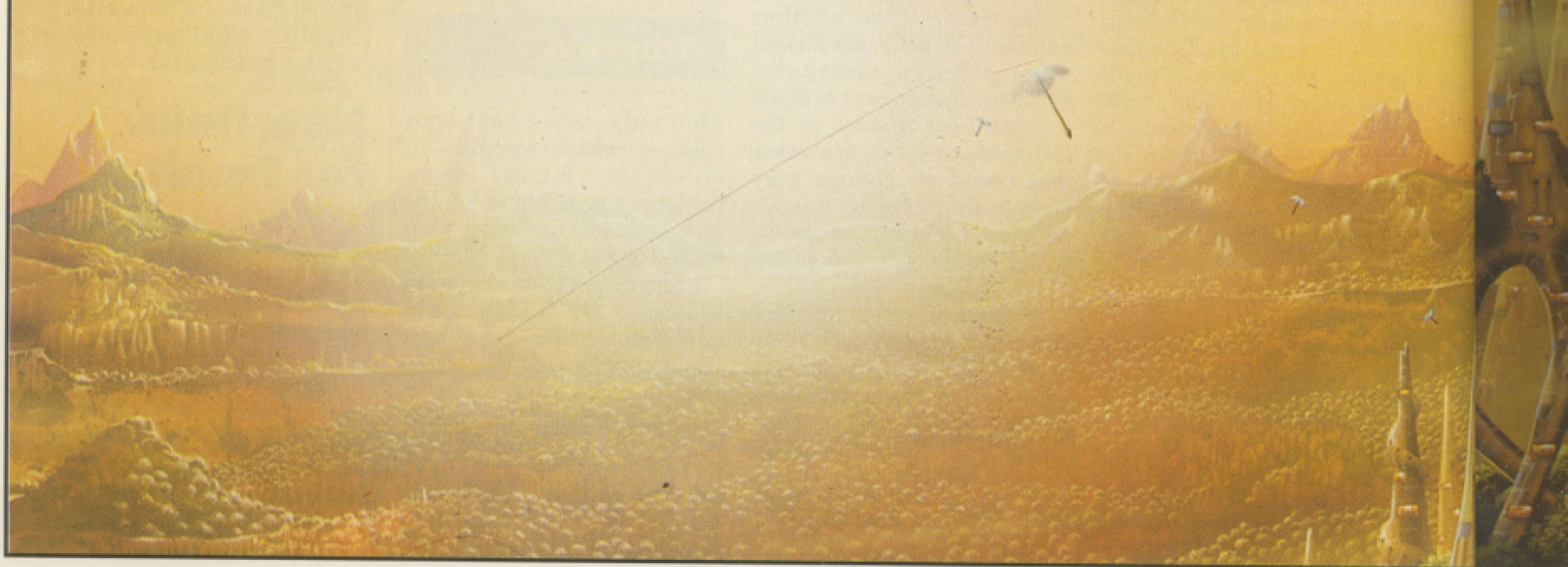
The main location pictures are often quite detailed, and moving the mouse pointer across them and clicking on interesting areas will reveal all sorts of things. Any items found may be picked up by clicking on the object and dragging it into the inventory window. To drop them simply drag them back into the main picture.

Clicking on one of the command words and then on an object in either the location or inventory windows will cause that command to be actioned on the item chosen. Most of the commands are obvious but "operate" has many uses. Select a key in the inventory, then operate, then a door, and the door will be unlocked.

Take care in which order you operate objects. The right way and you may well have your sword at the ready, the wrong way and you have just committed suicide with it. Use the save game option regularly as it is easy to get killed. Torches burn away with monotonous regularity and it is easy to use them up as you explore all the possibilities of a location. A saved ▶

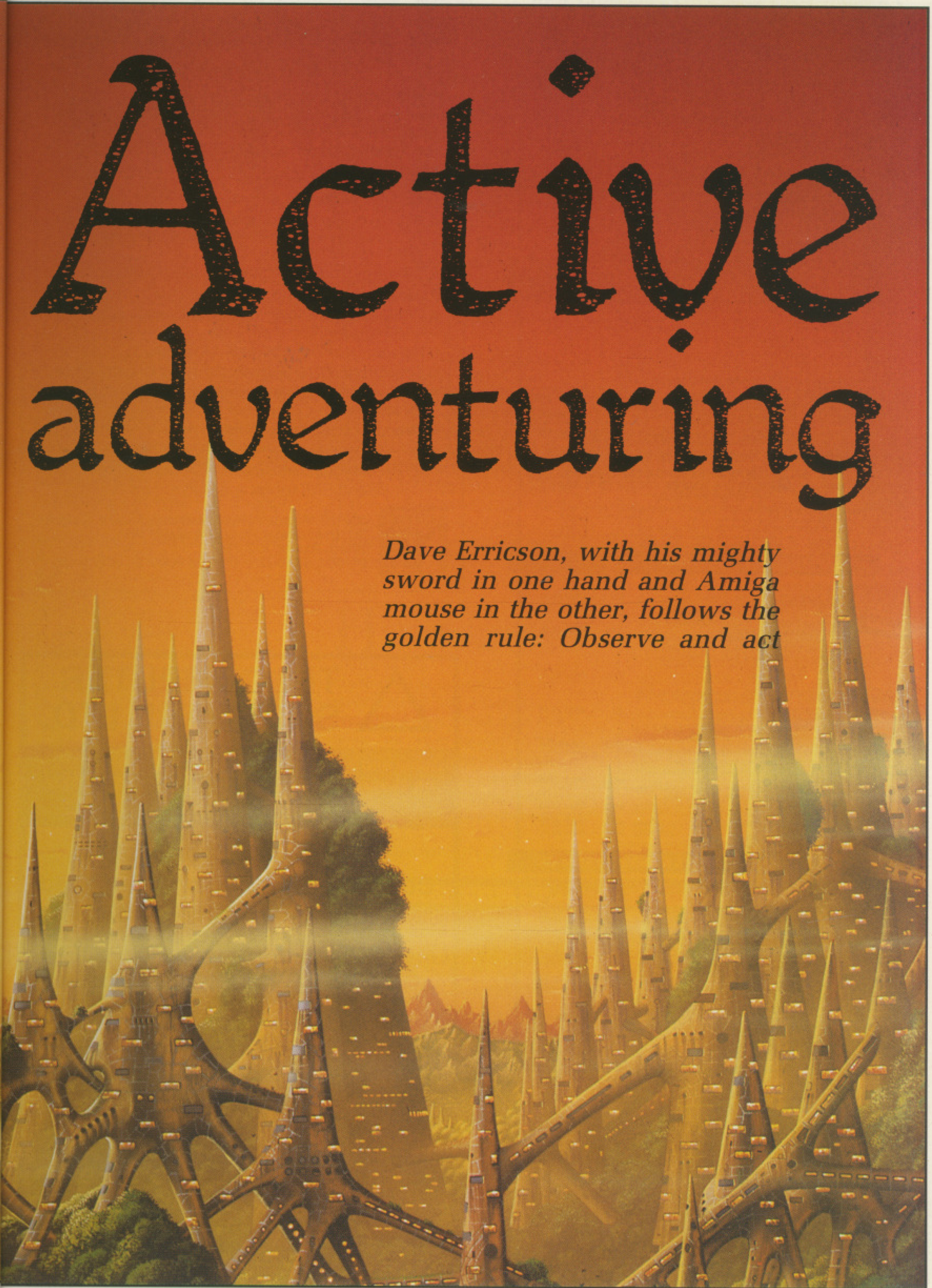


Your mouse may drag you into trouble



Active adventuring

Dave Erricson, with his mighty sword in one hand and Amiga mouse in the other, follows the golden rule: Observe and act



game will help here too.

Apart from getting past the first two locations – look in the skull – your initial problem is to get enough light to see by. There are plenty of torches and you must light a new one before the old one has gone out, as you do not have any matches. Once over these basics, examine everything you can think of, including the torches.

The graphics are very good and some of the animated scenes use plenty of the Amiga's potential. The sound effects are also well up to present standards. The game itself is one of finding and using the right object at the right time. There are usually some clues around but they are often more obvious after the event than before. Plenty of experimentation is called for; learn from your sometimes painful mistakes.

Although not cheap, Shadowgate will provide days of puzzlement. The operating system works well and at least you will not have to search for the right command words – just try everything. But above all keep your eyes open for anything that is the slightest bit unusual.

Those who like to feel the wind in their hair and the weight of a trusty sword by their sides will find Phantasie III, The Wrath of Nikademus, moderately addictive. It is definitely an active game requiring skill at arms and the ability to solve a number of puzzles. It is the third in the series of Phantasie games. The other two are not at the moment available for the Amiga and were in any case nowhere near so well presented. Both were good games but a little slow and to play compared with Phantasie III.

In each the evil Nikademus is encroaching on the lands of the good and your team of adventurers has to thwart his plans. This could well be the last of the series, as the final battle is with Nikademus himself and I think he is truly dead if you win through.

Your team consists of six characters, and your first task is to create and name them. There is a choice of race: Human, dwarven, elven, gnome, halfling or a random creature chosen from the list of ogre, minotaur, lizard man, pixie, sprite, troll, gnoll, orc, goblin or kobold. You may then select their class: Fighter, thief, priest, ranger, monk or wizard. Random creatures may only be thieves or fighters.

Having made your choices, the character's statistics will be shown in full. These are generated randomly and occupy the entire screen, giving you information on everything from social class and home country to figures for their adventuring abilities – fighting, swimming, thieving – and basic characteristics: Strength, intelligence, dexterity, constitution, charisma and luck.

It is these latter six statistics that you should concentrate on, as many of the others may be modified as the character gains experience. You may accept and name the character and or reject and "roll the dice again".

Higher values – up to 20 in some cases – produce a more powerful character. Reading the instructions will tell you that both race and class have modifying effects on these figures. Further reading will reveal that the values for strength and dexterity affect which weapons, shields and armour may be used. The higher the values, the more effective the weapon.

There is a large range of weapons and armour to be found and it is worth having one or two characters capable of using the ultimate equipment should you be lucky enough to find it.

The make-up of your party is very important you must have one or two tough fighters for the front line, a priest is vital to tend to their wounds, a ranger can fight and use a number of useful spells, wizards give you magical offensive ability and thieves and monks have their uses too.

You may create a number of characters and then choose the six you think are the best to make up your team. Characters may be created, renamed, dropped or added to the team whenever you visit a town.

When in town, you may visit the bank, guild, armoury, inn or the mystic, who gives you an idea of your party's score but very little else. A visit to the inn is vital, as resting will

REPORT CARD

SHADOWGATE
Mirrorsoft
£24.99

STORY LINE
Thin on any background detail

AURA
Graphics and sound set the scene well

STAYING POWER
Plenty of puzzles to solve to win

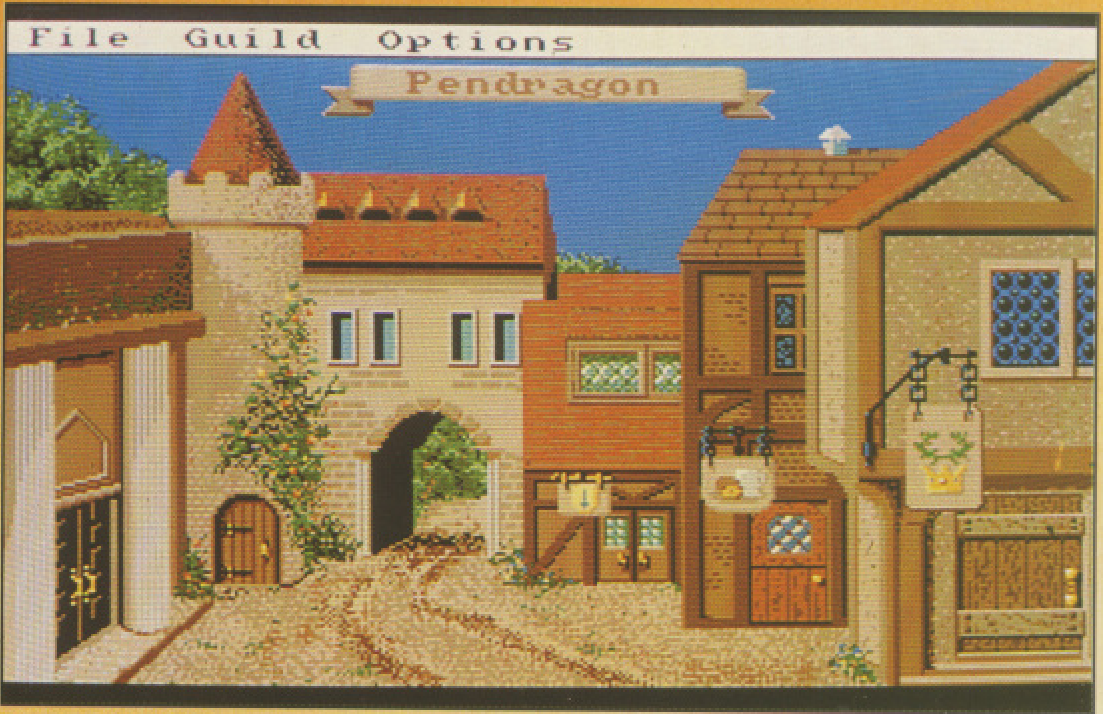
GAMEPLAY
Operating system tends to make puzzles seem a little repetitive

VALUE
Many hours to solve in depth

DIFFICULTY
Good challenge, but not too difficult

OVERALL 73%

A neat game that verges on addictive



Prepare for battle

replenish lost hit points and cure minor wounds.

The guild offers training in adventuring abilities and will determine their experience level. The higher the level, the greater the hit points and the greater the range of spells that may be learned. There are 56 different spells and priests and wizards have the greatest access to them, but even then will have to get to pretty high levels to learn the most potent ones.

You start in the town of Pendragon and initially will not have much money and only pretty poor weapons and armour. "View character", to check what they have got and then visit the armoury to see if you can improve their chances a little. For sale are scrolls which give you more knowledge of what is happening, but I would concentrate on the armour at this stage, as you can afford little.

It can be very, very dangerous to wander far from town; initially do not go more than a few steps away from safety. As soon as you have beaten a few monsters return to the inn and rest. Then save the game position. If the worst happens, and it will sooner or later, you can always load back that last save.

There are several options to choose from when encountering other creatures, ranging from dashing straight into battle to offering friendly greetings. You may also beg for mercy or try to run away. If there are a lot of potential enemies and if they are not of a hostile nature – read the instructions – greetings may be the order of the day.

Having chosen to fight, you must decide the tactics for each member of your team. Depending upon their level and class, they may thrust, attack or slash, lunge, use a bow, cast a spell or parry. You may move them forwards or backwards a pace or two, well armoured fighters to the front, weak wizards to the rear.

Several rounds of melee fighting will probably be needed to determine the outcome. Offensive spells can be very useful, especially on tough opponents, but spell points are used up each time. If you are deep in a dungeon, try to leave yourself with a few points in hand for emergences on the way out. A Sleep spell can put some creatures to shut eye, giving you a chance to either hammer the daylights out of them or run away.



Assemble your party

Another useful spell is awaken – especially if your party is asleep when attacked. Spell points are regained on a visit to an inn. There are also healing and magic potions that give you those few extra points, making the difference between life and death.

Each successful battle will give you experience points and possibly some gold – perhaps even a useful weapon or valuable treasure. Your priest will need to gain several levels before he can cast a healing spell that will replace a missing limb. So take care and be patient and meticulous in these brief early forays into the great wide yonder.

Just south of Pendragon are the town archives. These and many other special locations are classed as dungeons. Unlike the open country where you can plainly see where you are going, dungeons have to be explored a step at a time.

Prepare to meet locked doors and secret passages, traps and all manner of special locations, some good, some bad. These special places offer you the chance of great gains in experience and wealth, let alone all sorts of excellent weaponry. They also house some of the meanest monsters around.

Exploring the town archives, you will meet the old sage Filmon. He will give you your first quest, and having succeeded in it, will tell you what to do next. Each task will be more difficult than the last and will take you into more inhospitable dungeons.

The graphics are good, especially some of the larger monsters, but the limited sound effects can be a little wearing. Everything can be controlled using the mouse, and the speed of combat rounds can be speeded up once you have learnt to recognise the brief captions that appear during battle.

Phantasie III from SSI, distributed by US Gold, is one of the classic active adventures and is to be recommended to those who like this genre. If taken steadily at the start it is easier than many others and would make a good initiation for the newcomer to this type of adventure.

REPORT CARD

PHANTASIE III
SSI/US Gold
£24.95

STORY LINE
Well developed background history

AURA
Sweaty palms are the order of the day

STAYING POWER
Level of difficulty increases at the right rate to encourage persistence

GAMEPLAY
Only limited variation to puzzles

VALUE
Hours versus pounds gives value

DIFFICULTY
Patience and care pay off

OVERALL 71%
A classic for the role player

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By Bus: 266, 714, 716, 290, 30, 72, 73, 74.

Car parking facilities available at the Novotel.

DATABASE EXHIBITIONS



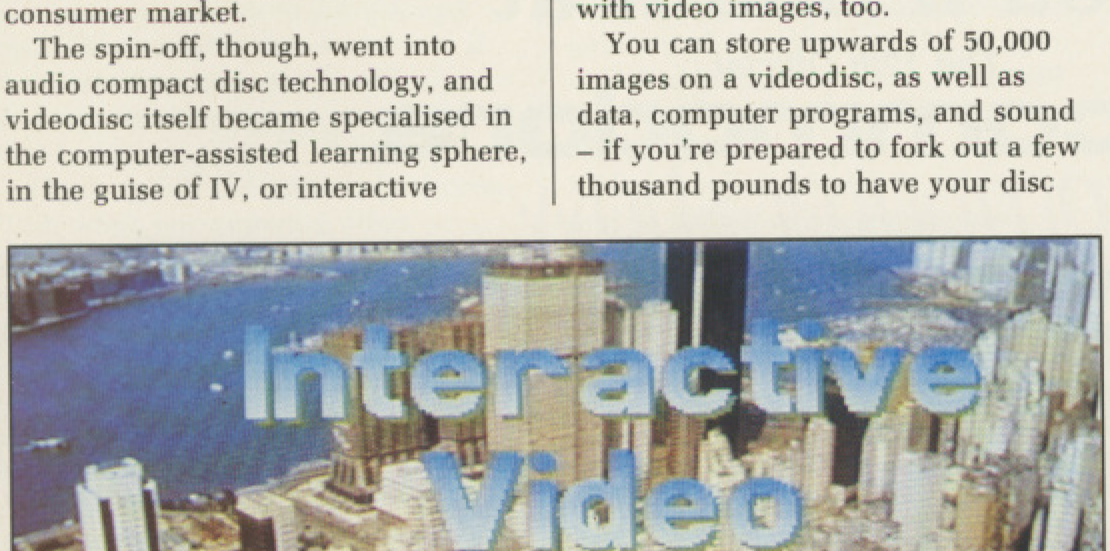
Rex Last introduces the fascinating world of interactive video and spells out what it could mean for Amiga owners

WHEN the Philips Laservision videodisc first burst on the scene, it was hailed as the new revolution in video technology, and soon – so it was predicted – every home would have a machine and a collection of films on disc just as they already had audio turntables and long playing discs.

Unfortunately, it didn't quite turn out that way. VHS was winning the video cassette war, and videodisc had the distinct disadvantage of being a read-only system. You couldn't just record your favourite TV programmes as you could with cassettes, and so the videodisc flopped in the home consumer market.

The spin-off, though, went into audio compact disc technology, and videodisc itself became specialised in the computer-assisted learning sphere, in the guise of IV, or interactive video. And now CD is also beginning to go interactive – and, ironically, with video images, too.

You can store upwards of 50,000 images on a videodisc, as well as data, computer programs, and sound – if you're prepared to fork out a few thousand pounds to have your disc mastered, that is. However, imagine the potential at your fingertips if you could directly control a videodisc player from your Amiga – and, if on top of that, you could superimpose questions, answers and other material on to the video image. Add sound to *that*, and you have a springboard for a mind-boggling leap forward in computer learning technology.



Overlaying text on video using Microtext

Now Ariadne has taken up the challenge for the Amiga with AAAE, which – take a deep breath – stands for Ariadne Amiga Application Environment. This serves as a shell for applying the Amiga to a range of different applications. In the present case, it offers a framework for Microtext and IV, together with a video player driver.

Microtext is a specialised programming language which was first designed by the National Physical Laboratory to facilitate the design of computer-assisted learning material. It turned out to be particularly suited to IV work, and in the early days of IV it was the BBC Micro which was the target machine for such systems. Using the BBC to control a videodisc system was rather like getting a donkey to pull a double decker bus – but now, the Amiga



with its stunning power and video potential is poised to grab a piece of the action.

The Amiga already comes with the capability to mix graphics and video which can then be recorded on tape, so it seems but a small step further forward to add to that the ability to drive a videodisc machine.

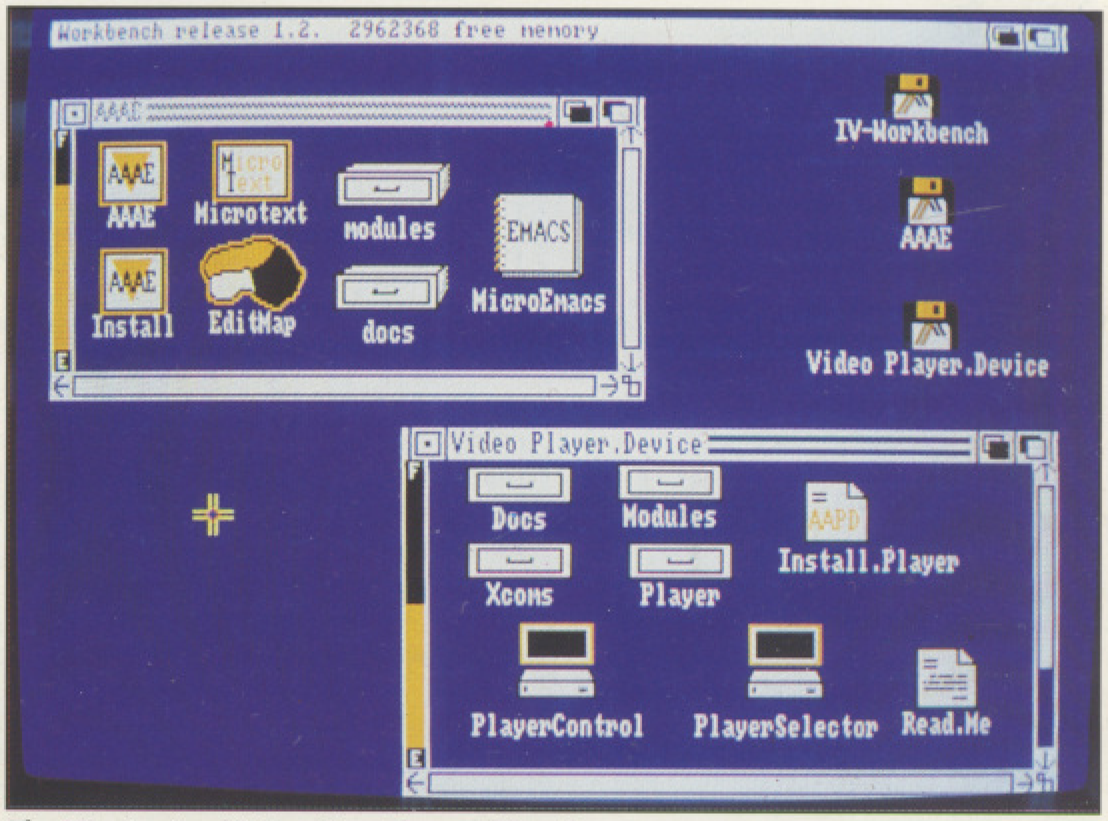
It can be done – but it all comes at a heavy price: Not just a cost in pounds, but also in the lead time required for design and development of the master disc, and then there comes the program design on top of that.

After a rather shaky start, IV has now really begun to capture the imagination of people in all areas of education – and there's a National Interactive Video Centre which serves as a focal point for information dissemination and which produces documentation for the IV enthusiast. More details on NIVC overleaf.

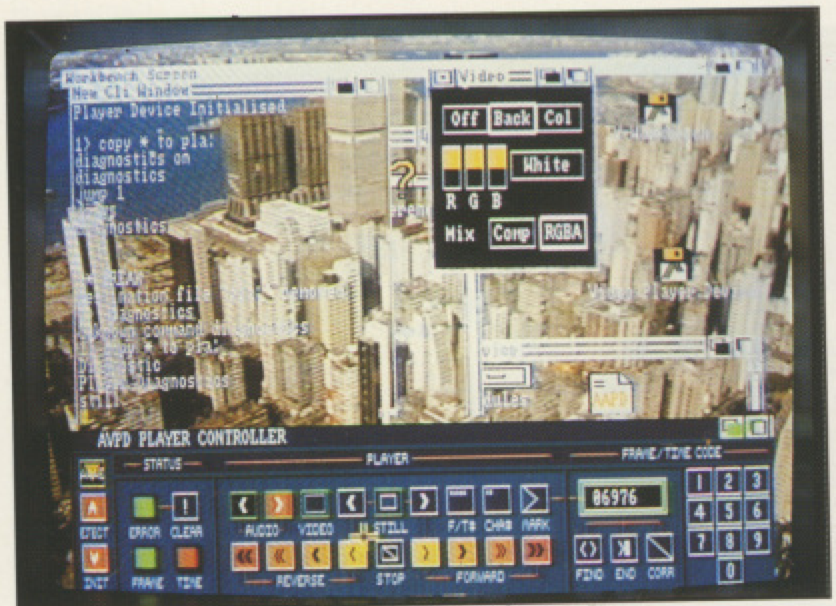
It's all very much constrained by the large amount of financial input required to get a system off the ground and working, so it's not surprising that business and industry are playing a major role in the development of IV. CBT (computer-based training) is taking a clear lead in IV techniques.

The Alliance and Leicester Building Society, for example, put together an IV system for teaching staff positive attitudes towards potential and existing customers, and accounts sales rocketed in branches where the system was tried out, to the point at which the initial investment was recovered in just seven months.

On the education front, the most widely publicised videodisc project has been the Domesday videodiscs produced by the BBC, but many other less well-known projects have been ►



The Microtext and interactive video workbench



The control panel makes driving the video easy



Programming with the editor

◄ under way in subjects right across the curriculum, from science and medicine to modern languages.

One early project in Spanish comes from Brigham Young University in the USA, where an interactive question-and-answer stroll round a fictional town is given the awful title Montevidisco.

What emerges from all these varied undertakings is the bald fact that, while the technology has certainly arrived and is here sitting on our desks, the necessary skills for designing appropriate course material are lagging quite a long way behind. It's a bit galling to see all that technology and expense going into something as old hat as a simple multiple choice question and answer session, when the potential is so huge.

And, of all the micros currently on the market, there's none to beat the Amiga's computing and video power to exploit this new wave in educational technology to the full. IV is particularly well suited to the Workbench environment and mouse control through the various icons and windows of the IV control package.

Next month we'll be looking at the AAAE in some detail and revealing how it can help Amiga owners to become interactive videopersons.

● *NIVC is supported by the DTI, by its corporate sponsors, and through earnings from courses, publications, counselling, special interest groups and project management. It has an unrivalled collection of IV hardware and software, produces a number of specialist publications, mounts IV courses of all kinds, and offers a free introduction to IV for visitors, who should ring for an appointment.*

The centre produces a magazine called Interactive Update five times a year. The annual UK subscription is £45.

For further information about Interactive Video, contact the National Interactive Video Centre, 24-32 Stephenson Way, London NW1 2HD. Tel: 01-387 2233

Why videodisc?

The world is full of video cassette recorders. Why go to all the trouble of using expensive videodisc systems when your friendly VHS and Beta machines are sitting waiting in the majority of homes in the country?

Well, just think of the access time from one end of a cassette to another. Consider too the tape wear caused by freeze framing, and then there's tape stretch and less-than-pinpoint accuracy in targeting a particular frame.

That's where videodisc scores: Very fast access time, freeze framing without picture distortion or wear, and absolute accuracy in getting spot on the right frame every time.

On top of that, videodisc is a digital recording system, which offers greater picture and sound quality, as well as the ability to record computer programs and data.

So video cassette is a strictly analogue and linear medium – you have to wind physically from one end to the other of a long, long tape, whereas the read head on the videodisc can be positioned swiftly on just the right frame by a simple computer command.

But there's always a black cloud with every silver lining. The snag in this case is that you can't just press the record button on the videodisc like you can on a cassette. Recording, is more than a little bit on the expensive side.

So now imagine a situation where there is a videodisc containing architect's drawings and stills of buildings from all round the world.

A trainee could summon up a program to test his knowledge of Norman or Perpendicular style – or he could be asked to move a pointer using the mouse to home in on a flying buttress or a gargoyle.

If he gets the answers right, he moves on to associate buildings with individual architects, like Christopher Wren or Frank Lloyd Wright – if he doesn't, he is branched off to a revision exercise.

You can begin to see that, given the appropriate software, you can design hundreds if not thousands of different exercises based on just one videodisc full of still frames – and the possibilities of mixing moving pictures, music, sound, computer-generated text and graphics, and on-disc programs and data all add up to an exciting treasure house of almost limitless potential.

The only limit is on your ingenuity as a designer of the appropriate software.

Ray tracing for the impatient

Turbo Silver is the fastest ray tracing package for the Amiga. Sam Littlewood shines a little light on the subject



RAY tracing on the Amiga has produced remarkable pictures and animations in the past. Unfortunately, these spectacular creations took inordinate lengths of time to produce. A moderately complicated animation might take 10 hours per frame, so producing a 50 frame animation at this speed will give your Amiga something to think about for the best part of a month.

A smooth animation needs to run at a minimum of 15 frames per second. My patience is limited to slightly less than two days, about a tenth to a half of a second of animation.

The original version of the Silver package was in the same time-consumption league as other ray tracers. The latest version, Turbo Silver, lives up to its name however and is typically five to 10 times faster. This means it is now possible to start the program last thing at night, and hope that something useful has happened by the time I get back from work the next day.

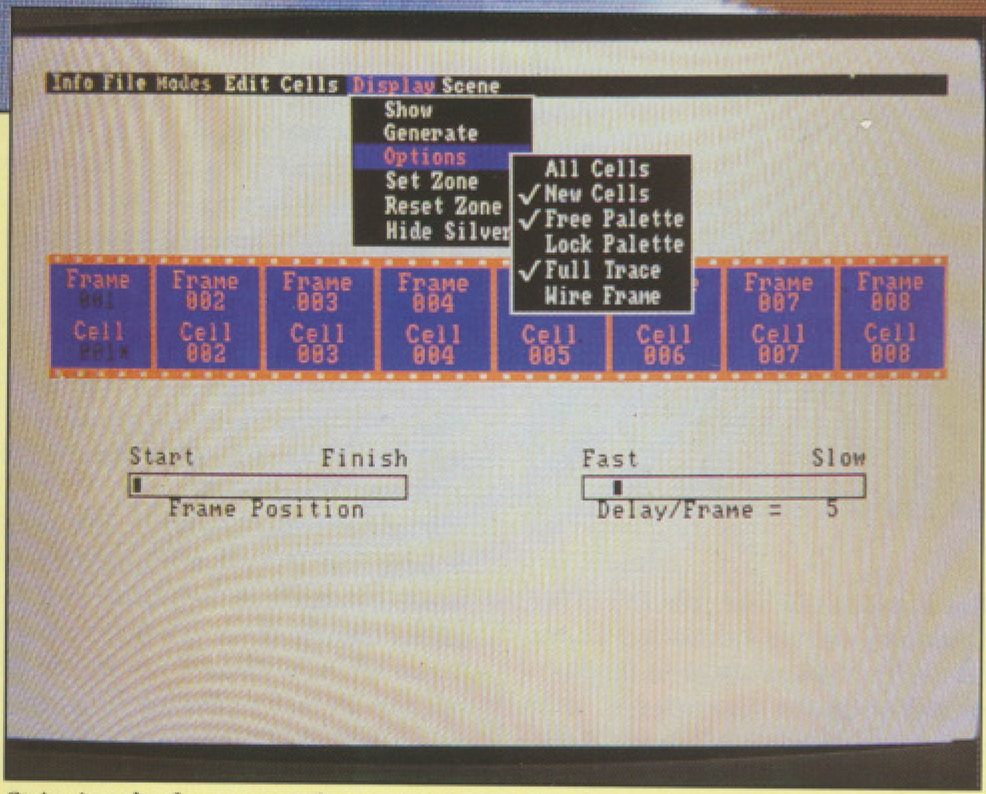
The time taken to produce a single frame is reduced to a long coffee break, letting me go through three or four iterations of trying to get a picture right in one evening.

The review copy of Turbo Silver came in a three ring binder containing a manual, two discs and several bits of paper. So far so good? No, the manual in the binder was for Silver 1.0. The first disc was Silver 1.1, a few sheets of paper described the differences between 1.0 and 1.1. The second disc is Silver 2.0, or Turbo Silver.

Another piece of preliminary documentation describes how Turbo Silver differs from 1.1. This meant chewing through documentation for each version to find out how



Sample output



Stringing the frames together to produce animation

to cope with the latest version – a distinctly confusing task.

To get owners to return the registration card, the last chapter of the manual, "Hints, Tips and Magic" is only supplied when Impulse receives the card.

While reading, I started to wonder if the manual's authors had let anyone else read it before printing, or indeed read it themselves. The original manual has some good sections, but parts of it are totally confused. The addenda describing the new versions read as if they were produced on a dictation machine minutes before the printing deadline.

Fortunately, the software is somewhat better than the paperwork. Some excellent features make it unique. The package requires at least 1Mb, a feature of animation systems in general. It is not protected, and the user is advised to make backups.

The disc contains some example pictures produced with the package, an IFF picture displayer and an animation player. Turbo Silver is moderately PAL compatible, there are some glitches. The program does not take over the machine and uses Intuition for its interface.

Turbo's start up screen looks like a strip of film across the centre of the screen. Each shot represents a frame of animation for editing. Frames can be cut, copied and pasted around the animation.

Once a new animation has been opened a frame can be selected by double clicking moving you into the object or cell, editing part of Turbo Silver. This is similar to a CAD package, with controls for colour, texture and reflection. Once all of the frames have been described, you can generate the animation. There are facilities for generating individual frames and doing a fast preview – a pencil test – using just wireframes.

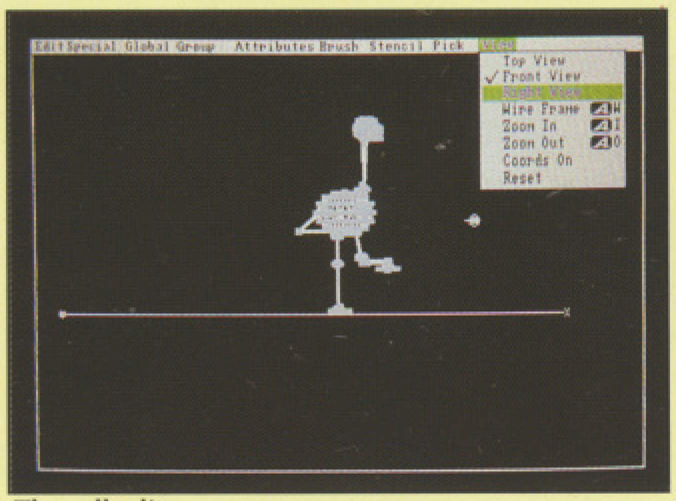
There are three distinct tasks on the road to producing an animation. Modelling, describing the objects in the world, animation – how the objects move and change over time – and rendering that is producing the sequence of pictures.

TURBO Silver's cell editor is used for modelling. Objects can be made up of triangular facets, stencils, a surface or perfect spheres – the easiest objects to ray trace. In addition to the objects, there is a camera and a single light source. One of Turbo Silver's greatest limitations is that you can only have one light source.

The cell editor provides a view into the world being created from either the top, the front, or the right. These ▶



Stencils allow you to mix IFF files with ray-traced images



The cell editor

can be zoomed or panned, the views taking up the whole screen, only one being visible at a time.

The core of all objects is the axis. This is invisible as far as any picture of the scene goes, but appears in the cell editor as a point with little X, Y and Z axes attached to it showing the orientation and position relative to the rest of the world.

To make a visible object, points are added around the axis followed by facets between the points. It is these facets that make the object visible in a final picture. This conglomeration of bits can be moved and rotated by using the central axis.

Objects can be grouped together – one object is the parent, and one or more others are children. These children could well be the parents of yet more groups. This is an excellent system, allowing complex forms to be built up and then treated as a whole.

The cell editor works in several modes. These modes correspond to the things that you are currently working with – groups, objects within a group, facets of an object or points. At each level there are keys and menu items for selecting, cutting, copying and pasting as well as means of positioning, scaling and rotating. This manipulation can be controlled with the mouse or the keyboard, a theme running throughout the package. Objects can be named, allowing them to be easily found later.

There are facilities for adding useful ready-made objects, such as cylinders, toruses, cones and spheres. These are all made of facets, and can be a good starting point for cutting, stretching and chopping to a give a desired shape.

A further pair of tools can be used to take an existing set of points and either extrude them, making an object like a pastry cutter, or spin them, making something like a wine glass starting from half the outline.

Stencils are one of the features that make Turbo Silver really interesting. A stencil is a flat rectangular plate with an associated IFF file. This is scaled to fit the stencil, and wherever the IFF file has the background colour the stencil will be transparent. The rest of the stencil does not have the colour from the IFF file, but that associated with an object.

Some examples of things that could be done are a complicated glass logo, the leading for a glass window, or a stencil off stage to project an interesting shadow on to the scene. The possibilities are endless.

By default Turbo Silver shapes are smooth matte white objects. There is a plethora of ways of describing the colour and texture of objects. To start the parade, a whole object, or individual facet, has a colour. The object can have specular highlights – the effect where a bright light is reflected off a shiny object giving a spot that is the colour of the light, not the colour of the object.

An object might have mirror-like qualities. The level of this reflection can be controlled separately for the red, green and blue components of the light. This can be used to create a Christmas tree ball.

Objects might be refractive – light is bent at the surface leading to distortions when looking through, say, a glass vase. This can add realism to a scene, but to be effective, there must be something that can be seen to be distorted, such as a checkered floor.

The final colour aspect of an object is how much it filters light. This is used to work out the shadows and arises from a short cut that has to be taken when writing a ray tracer to operate in timescales less than the geological.

Textures are easier to work out. The flat facets of an object can be made to appear a continuous smooth surface, rough or just plain flat.

A final, and very powerful, feature is the ability to take an IFF file and map it on to an object or group of objects. Examples might be a cylinder with an appropriate soft drinks label wrapped around it, or a model of the Amiga with a screen dump mapped on to the monitor screen. This is a speciality of Turbo Silver, and it makes for some interesting possibilities.

The level of control that Silver provides over colour and texture is incredible, albeit somewhat confusing. It is helped by menu options to set up common levels. I found that the easiest way to explore

this area was to use a sphere and checkered landscape, giving very fast rendering and a good feel for what the combination might look like on a more complex object.

The cell editor is somewhat obstructive. A bug means that although the windows occupy the full 256 PAL lines, the lines representing the edges of facets are still clipped to the 200 line limit.

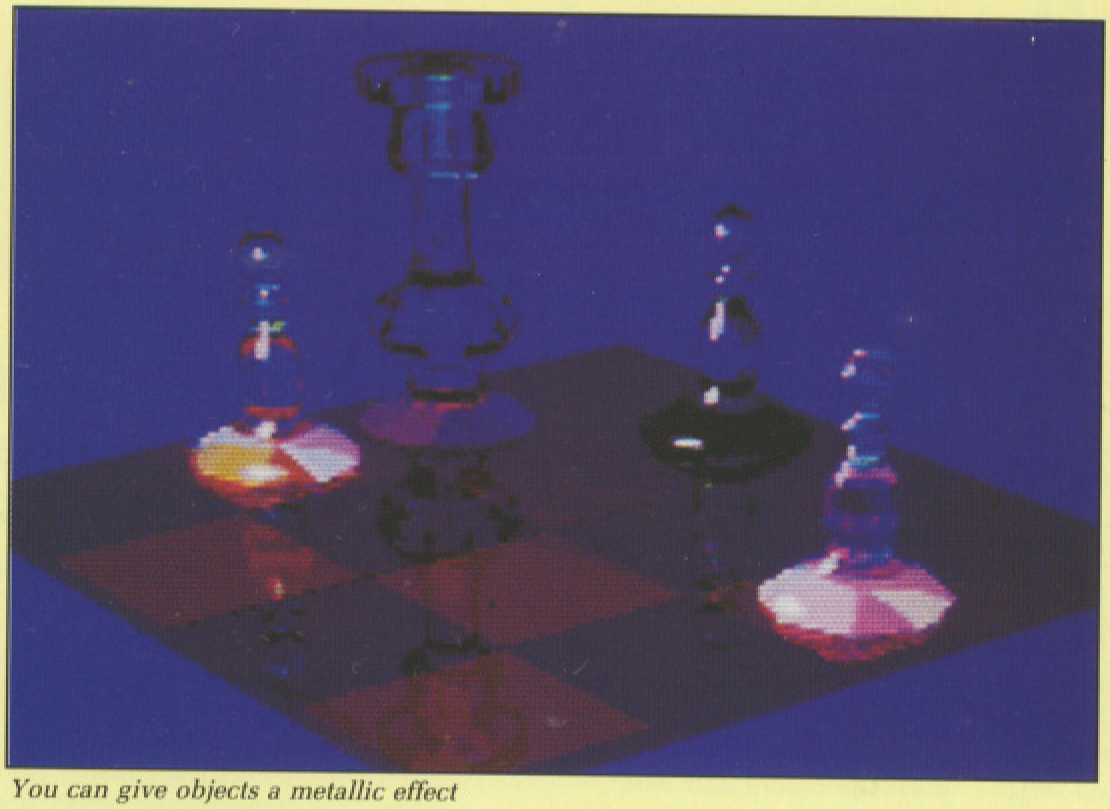
When controlling rotation and position of an object, a new window pops up obscuring the view of the world. These adjustments have to be made blind with no feedback as to what is going on. The tools for creating objects, although plentiful, do not provide quite enough to make me feel confident that I could visualise an object and then build it, something I do feel when using Sculpt-3D.

There is no facility to import objects from other programs, or generate scripts – a small aspect of the whole program, but I often want to grab an object that I built on another system or write programs to generate complex objects and control animation.

The hard way to generate the sequence of cells for an animation is to edit each cell separately. However Turbo Silver does go some of the way towards easing this task. A special object is created that is just a set of points. This set of points can then be used to describe the path of other objects. A limited amount of control is available over the rotation and scale as the object travels along the path. A hierarchy is possible, allowing complex motions.

Turbo Silver calls paths "stories", and once a cell with stories in it has been made, the effect over time can be propagated over several cells of the animation. A useful feature is that the same cell can be used in more than one of the final frames.

Although an animation system is present, it is somewhat limited. To produce interesting motions with an object pitching and rolling still needs work on each individual frame. The ways in which the stories are propagated are not remembered, so if a story is changed in the original cell, it has to be re-propagated by hand to the associated cells. This is hard work if a complicated set of stories is being used.



You can give objects a metallic effect

Wireframe pictures can be used for previewing, giving a generation time of a few seconds per frame. To generate the final pictures, the ray tracer is used. This is the best part of the package, and is head and shoulders above other products on the Amiga. The performance is excellent, beating other ray-tracers on the same hardware by an order of magnitude.

It is possible to use any of the Amiga's graphics modes, generating overscan images. It successfully takes a PAL system into account. The flexibility of the renderer has already been alluded to by the attributes that can be given to objects. In this area also, the renderer beats other packages hands down. I only wish I could use this renderer to produce animations modelled on other systems.

Overall Turbo Silver has its good and bad points. The good is mainly associated with the rendering portion of the package. The editor and animator have not quite reached the same maturity. The documentation is not up to scratch, although it appears that it will be properly produced in the near future. Until that time, I would not recommend the package to anyone making their first foray into this area.

If you are already comfortable with similar packages the powerful rendering techniques of Turbo Silver will provide new avenues for exploration. Other aspects may well be frustrating. Now that I have both packages I am looking forward to getting hold of a version of Interchange which will allow me to edit with Sculpt and render with Turbo Silver.

REPORT CARD

Turbo Silver
Impulse/HB Marketing 0895 444433
£139.95

USEFULNESS
A complete ray-tracing and animation package, you don't need to buy any extra software to produce cartoons.

EASE OF USE
A better front end than the atrocious Videoscape but lags behind Sculpt 3D.

INTUITION
Written to Commodore guidelines but the high processing overhead needed for ray-tracing makes multi-tasking slow.

SPEED
Excellent, beating other Amiga ray-tracers by an order of magnitude.

VALUE
Cheaper than the Sculpt/Animate combo but still expensive if you just want to experiment with pro-style graphics.

OVERALL 72%
Cheaper and faster than the direct competitor – Sculpt Animate but not as flexible or as friendly.

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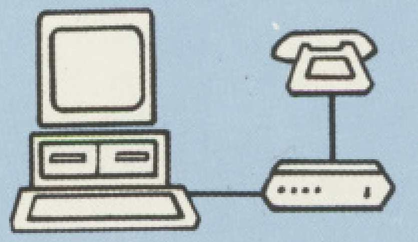
Translation – Access the biggest and most up-to-date multi-lingual dictionary in the world, with over 400,000 words.

News – Use the powerful search commands to pinpoint vital business information from the world's leading news services, newspapers and periodicals.

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When you join MicroLink you've got the whole business world at your fingertips – 24 hours a day. You'll have immediate access to ALL the facilities offered by Telecom Gold ... and a great deal more besides.

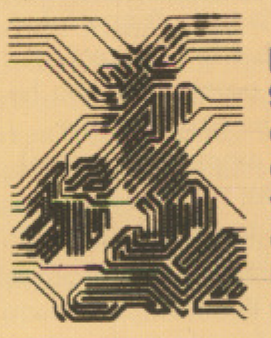


	Typical comms packages
A	*Pace: Nightingale V21, V23 manual-dial modem + Rubycomm Software + RS232 lead (£199 inc carriage & VAT)*
B	*Pace: Linnet V21, V23 autodial modem + Rubycomm software + RS232 lead (£257 inc carriage and VAT)*
C	*Miracle: WS4000 V21, V23 autodial modem + Rubycomm software + RS232 lead (£286 inc carriage & VAT)*

All you need – apart from your Amiga – is a modem, which plugs into your telephone wall socket and suitable communications software.

We have provided a list of possible combinations (left), ranging from the very cheapest to ones which can automatically dial the MicroLink telephone number and connect you directly to the service – all you have to do is type in your personal security password.

Whichever equipment you use, you will be able to call MicroLink, open your mailbox, save to disc any messages waiting for you, and disconnect in as little as two minutes.



More than 90 per cent of subscribers can connect to the MicroLink computer at local call rates.

TO FIND OUT MORE Fill in the coupon and send it to the address below. You will receive full details of services and costs, together with an application form. Complete this and within days you and your Amiga will be able to use all the services of MicroLink and Telecom Gold.

Please send me full details about MicroLink, and information sheets about the following hardware and software options (please circle):

A B C

Name__________

Address__________

Postcode__________

Send to: MicroLink, Europa House, Adlington Park, Adlington, Macclesfield SK10 4NP.

AMC9

The plain man's guide to CLI

Phil South is the lumberjack you've been looking for if you can't see the wood for the directrees

IT'S funny, but after the piece I did on ASSIGN a couple of issues ago, it occurred to me to consider why it is that we need to ASSIGN all these logical devices to various directories – and what are they supposed to be? This set me thinking. What is the minimum structure of an AmigaDos disc?

To find out more I did a quick ASSIGN command on its own in a CLI which yielded the following interesting information about the currently mounted disc, which at the time was my copy of WordPerfect:

```
tRAM:t
Swp:s
Lwp:l
Cwp:c
FONTSwp:fonts
DEVSwp:devs
LIBSwp:libs
SYSwp:

Devices:
DF1 DF0 PRT PAR SER
RAW CON RAM
```

It seemed that all the logical devices were ASSIGNed as I expected. So what was in these directories, s, l, and devs?

The directory s contains sequences – batch files of AmigaDos commands, the most important being the startup-sequence file which sets up your computer the way you (or the programmer of the disc you're running) wants it. This special batch file is executed on startup, configuring the system, setting keymaps, and most importantly, loading Workbench and quitting out of AmigaDos CLI.

I only mention startup-sequence in passing, because all of you should know about it by now, especially if you've got a memory upgrade with a clock, where you have to SETCLOCK OPT LOAD the time into your Workbench. Good, let's move on then.

A batch file is a sequence, almost a sort of program, of AmigaDos commands, which is executed from a CLI. When the Dos word EXECUTE is typed, the computer looks for a batch file in the current (CDed) directory. If it doesn't find one there, it searches for the directory that you ASSIGNed to the logical device S:, which in most cases is s as I've said.

The l directory holds all the large commands in AmigaDos and the overlays for the system which can't for various reasons be resident in memory, and need to be loaded each time. In most cases, this dir will contain the Disc-Validator, Port-Handler and Ram-Handler overlays.

Incidentally, if you ever get a disc which the computer can't validate, get a good disc, let the computer load the validator off of that disc, and then reinsert your disc to salvage the files on it. Neat trick, and a very useful one.

The most important directory has to be c. It's within this innocuous looking dir that all the AmigaDos command set lies. If you've invented some new commands, or have loaded the SHELL from Metacomco, this is where you'd store them. Then AmigaDos (the EXEC level) knows where to look for them.

Any command word or program entered here can be executed simply by typing it. Just think of each command as a little program in it's own right, then you'll get the picture.

The fonts directory is self explanatory really, holding all the fonts info, and this is where wordpros, notepad and Deluxe Paint look for the fonts they need. If you nab any new fonts from anywhere this is where they go. The Amiga scheme of things means that programs can use fonts that the programmer doesn't know about.

The two remaining directories are very interesting. The libs directory contains all the libraries and overlays, like translator.library and info.library. These are called when a C or machine code program uses the OpenLibrary command.

One of the great strengths of the Amiga is this use of libraries. It means that not only can commands not resident in the system be implimented and used in programs, but they need not be resident in the computer hardware, taking up valuable rom space with basically menial tasks.

The only other directory is the devs, and this deals with the Mountlist file and all the physical devices, as mentioned in the ASSIGN listing I got in the beginning, plus assorted keyboard maps (keymaps), printer drivers, clipboards and the system configuration file. Mountlist contains a list of Mounted devices, unsurprisingly, and the system configuration file contains all the info about the disc icon, pointer and Workbench default colours.

The devices are files for the computer to look at the configuration of the printer, to check the narrator and keep tabs on the serial and parallel ports. Without a serial device on your disc, you can forget going anywhere by modem.

The printers is interesting though. You can prune some of these off a disc if you want to make space. If you only use a HP Laserjet and an Epson, why carry 14 other drivers around? The same goes for keymaps. If you only use keymap gb, then why keep usa0, usa2, n, i, f, dk and cdn? There's no point.

So, there you have it, the short guided tour around the directory trees of AmigaDos. Knowing what needs to be there on your discs is useful knowledge, especially if it's your aim to trim down your working WB/CLI disc to make for faster access.

Expanding



WHEN people ask why they should buy an A2000 instead of an A500 it is often difficult to justify the price difference. After all, you could get two A500s for the price of one 2000.

The main difference of course is expandability, or as the computer-techie adspeak men would have it, open architecture. This means that the A2000 is designed to have bits added on to it. Most of the computers which have proved be successful among the business community offer open architecture, including the Apple II and IBM PC.

Back in the days before the A500 and A2000 were launched Commodore-Amiga laid down a standard for an 86 pin expansion system, known as the Zorro bus. When the A2000 was designed it was decided to incorporate some extra routes for expansion. So if you look inside an Amiga 2000 you will find five 100 pin slots, two IBM PC/AT compatible slots, two IBM PC/XT slots and one video slot.

The 100 pin connectors are called the Amiga bus, and they are the successor to Zorro. The other things which the Amiga 2000 has and the 500 does not are 1Mb of ram and a battery backed-up clock. The ram and clock can be added by fitting an A501 expansion.

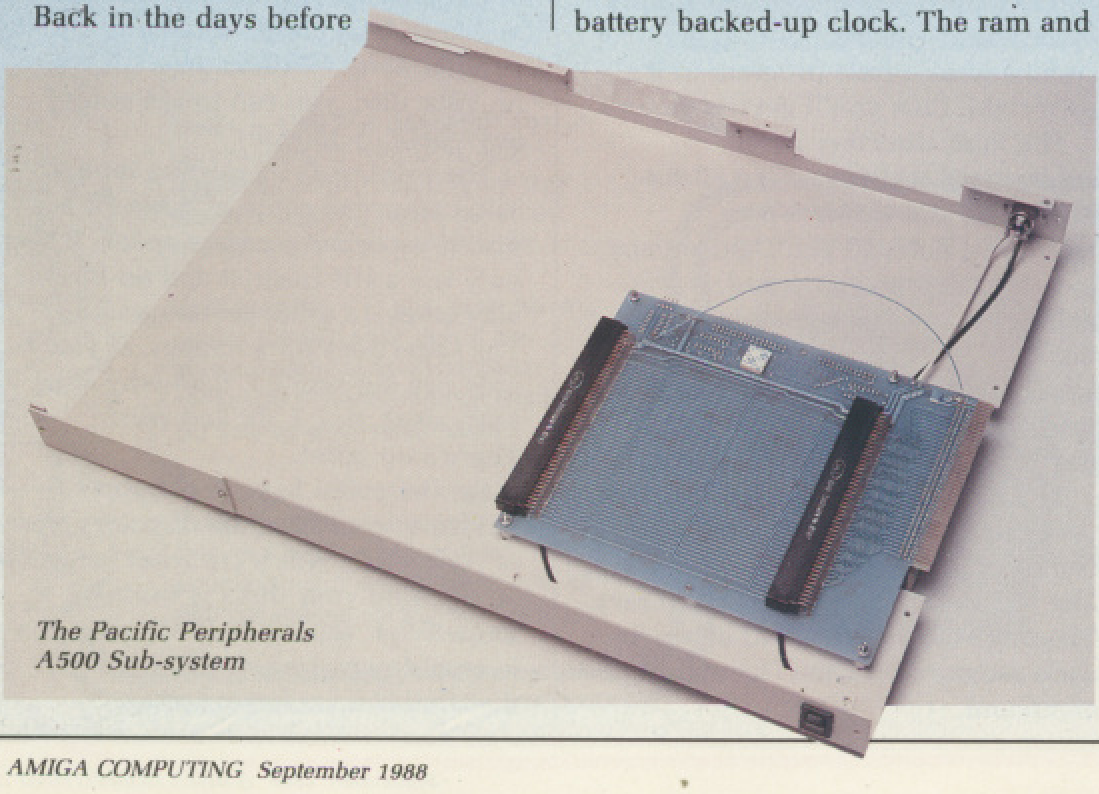
So the difference between an expanded 500 and a threadbare 2000 is a bunch of slots. It's hard to justify £400 for just that. Most people faced with forking out the difference or opting to take the money and run will decide that they could do with the exercise.

So armed with an A500 the owner trots off happily. Happy that is until the time comes to expand the system, add a hard disc, or some more ram – when he'll run into the brick wall of closed architecture.

As always there is someone prepared to make some money from the situation – enter Pacific Peripherals. It is a Californian company – hence Pacific – which makes add-ons – hence Peripherals. Its solution to our jogger's aching nose is called the Sub-system. Which in a bid to wreck the logic of this paragraph has nothing to do with allied U-boats.

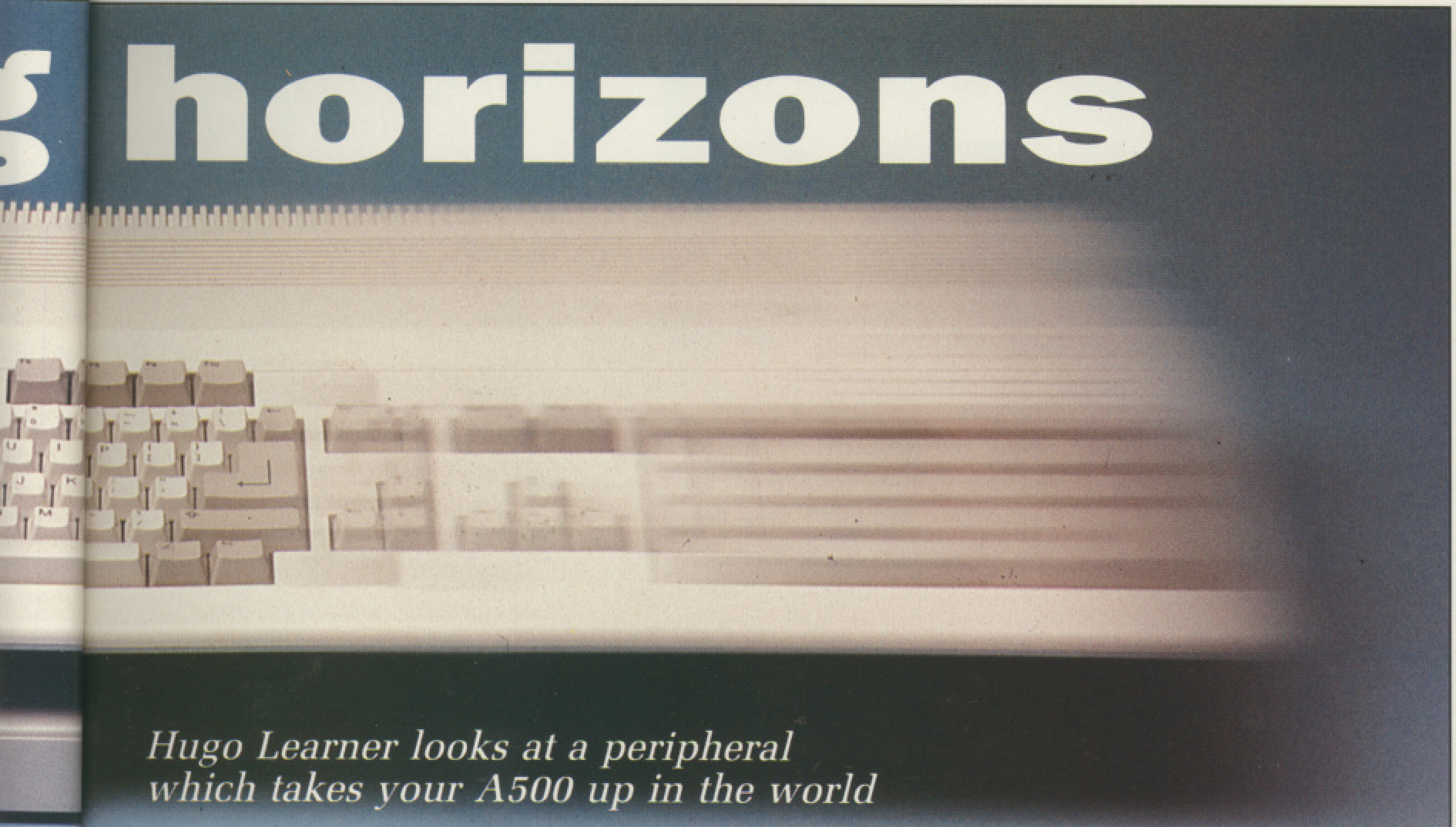
This contains two 100 pin slots and fits underneath an Amiga 500. Signals are fed into the box through the edge connector on the side of the A500. The result is a system halfway between an A500 and an A2000, call it an A1250 if you like.

Just as it is not worth buying an A2000 unless you are going to put



The Pacific Peripherals A500 Sub-system

horizons



Hugo Learner looks at a peripheral which takes your A500 up in the world

anything in it, you need to have a use for the Sub-system before paying out good money for it. The most likely set-up is a hard disc controller and a 2Mb ram card. This mimics the A2000 set-up which the Ed has in the office and loves so much that he doesn't go home at night.

Most of the cards you will want to fit will be expensive, and there aren't that many different types – yet. Commodore offers two goodies – the A2090 hard disc controller card and the A2052 ram expansion. Bear in mind that the A2090, and for that matter any hard drive controller, is designed to sit with the winnie inside the box. There just isn't the space in the Sub-system, so you will have to find a case and a power supply for the drive. It is not electrically sensible to use a shoebox, but this hasn't stopped more than one Amiga user from risking 240 volts.

Real soon now – it usually means "we are still working on the specification" – they should have the A2058, an 8Mb board. Just think... a 9Mb Amiga; makes your friend's 1040STFM look pretty sad.

Other people sell disc drive controller cards and ram expansions but there the highway of choice becomes complicated. For the well connected, Taurus sells an Ethernet networking card. This allows you to communicate at 10 megabits, or more than 33,000 times faster than loading a program on a C64 cassette deck.

There are more goodies on the horizon. Many companies are working on second serial and parallel boards. With four phone lines, modems and RS232 ports you could multi-task your comms software to log into Prestel, Compunet, MicroLink and Cix all at once. You'd soon find a penny a minute was the least of your worries.

More than one Centronics port would offer the joy of being able to digitise a screen and print it out, without doing battle with more wires.

What won't fit into the Sub-system is the pack of cards which uses the other slots. This includes the PC Bridgeboard because it needs the PC slots and the CSA 68020 boards because they need the 86 pin processor slot. Oh well I suppose someone might bring out a 68020 card for the 100 pin bus. Just think Unix on your 500. I can hear my overdraft going to Defcon 2 as I write.

Many of the telly addons are strangers to the Sub-system; they want the video slot. FlickerFixer? No way, Jose. Video Toaster? Not cooking.

So, provided you only want the 100 pin busses the Sub-system could provide slots of fun. It looks pretty, painted the same off-cream as the A500, and well made in sheet steel.

There is space for a second disc drive, but not for a power supply which hangs Commodore-like on the lead. Inside, is pretty simple, designed as though printed circuit boards are made of Welsh gold, but it works and the connections are firm. Screw it all back together, plonk the computer on top and it looks most professional. It won't give you all the scope of a 2000, but you get close.

REPORT CARD

Sub-system
Pacific Peripherals/Argonaut Hardware
01-208 0072.
£230

USEFULNESS
What makes the Sub-system useful is the flexibility in offers not what it does on its own.

EASE OF USE
Plug in and go. A bit fiddly to open an internal power supply would have been neater but increased the height.

VALUE
Cheaper than upgrading to a 2000 but does not offer the other connectors.

OVERALL 76%

The best way to expand an A500 until Commodore's A590 arrives at either the end of this year or early 1989.

Kind on the wallet

Bill Tomlins runs some letters through a budget word processing program to see if you can expect professional software at quite low prices



KIND Words is a new American package described as a fully featured word processing program. One feature in particular makes it stand out on the Amiga. At £49.95 it is considerably cheaper than most.

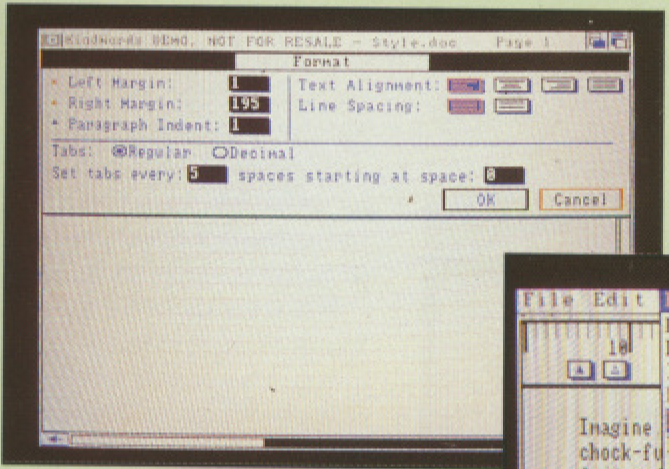
The program comes on two discs with a 60 page A5 manual. The documentation is well produced, very readable and, on the whole, adequately describes the program's operation. More tutorial sections would have been helpful. Compared with the 600 plus pages of the WordPerfect manual, it makes very light reading.

Installation is very simple, as the program is not copy protected and for floppy disc installation the manual tells you to make copies of the discs. Details of how to install it on a hard disc are provided.

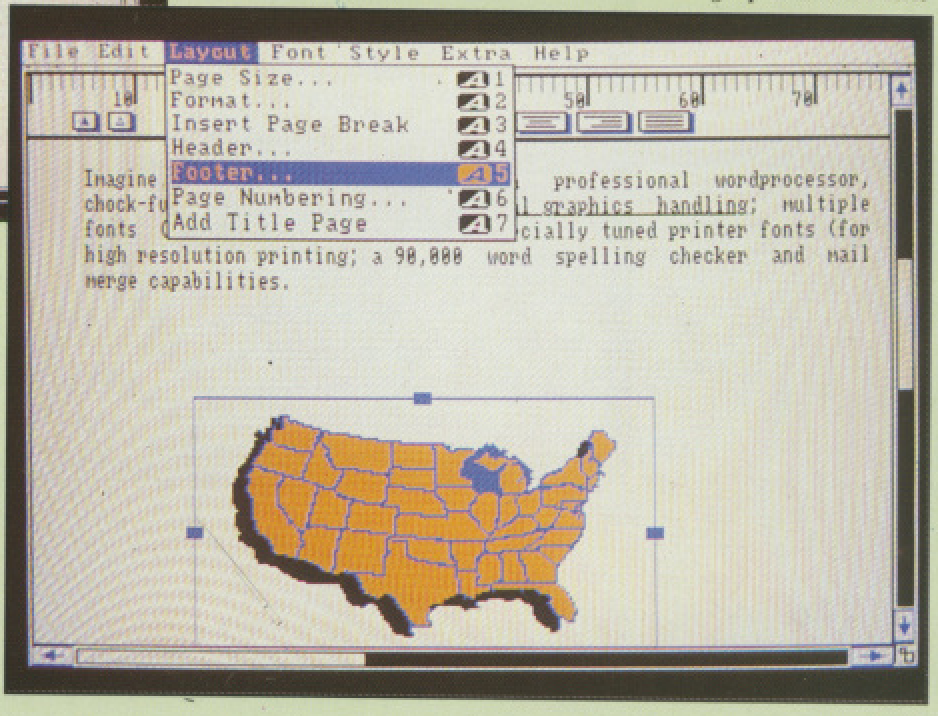
Kind Words will work with only 512k of memory and a single drive, but the manual recommends that the memory is upgraded so that the spelling checker can be loaded into memory. When used with only 512k there are a number of restrictions – the CLI, Preferences and external drives should not be used. The number of font and style combinations should also be restricted when printing with the SuperFonts.

I tested the package on a 1Mb Amiga 500, with two drives. No initial configuration is required, and getting it running consisted of putting the program disc into the internal drive when asked for a Workbench disc and the Superfont disc into the other drive.

The upper part of the screen is taken up with a deep ruler containing a number of large icons as well as ruler graduations. Two of the icons pictorially represent single and double spaced text and the remaining four cover left, right, centered and fully justified text. You select the line



Customising the page



You can mix graphics with text

spacing and justification by highlighting the appropriate icons.

Text is shown appropriately justified on screen and this can lead to some very confusing effects during the course of editing, as words shuffle around all the time.

Left and right margins may be dragged to the positions you want on the ruler. Normal and decimal tabs are supported – up to 10 can be dragged on to the ruler. Ruler settings and justification may be changed as often as required and the settings for the various parts of a document are remembered. There is no form of style sheet or standard layout so you must set them up each time you want to change them.

KIND Words uses IFF format files, which may be loaded, saved or merged by selecting from a pull down menu. Documents may be saved as plain Ascii files for use by other programs, and Ascii files may also be merged into documents.

Scroll bars are used to move around a document and operation is reasonably fast. Alternatively you may use the cursor keys or combinations of Alt or Ctrl and the cursor or numeric pad keys. The cursor may be re-positioned on the screen by placing the pointer where required and clicking.

Many of the editing features available from the menus may also be selected by keystrokes, using an Amiga and letter key combination, though in some cases the letters chosen seem to have little relevance to the task required. Brief Help, listing the keystroke shortcuts, is available.

Block functions are an important part of any word processor and this one provides several ways to mark blocks. One may be marked by clicking once, dragging the cursor over the text and releasing. Alternatively, double clicking when the cursor is on a word will mark just that word. Treble clicking will highlight a complete sentence.

Marked blocks may be cut – deleted and stored in the clipboard – copied – a copy stored in the clipboard – pasted – restores the last block stored in the clipboard at the current cursor position – or cleared. This is done by selecting from the Edit Menu.

There is also an undo feature that allows you to countermand the last 256 key strokes, or to restore cleared text. This works as long as the cursor has not been moved since deletion. Useful if you change your mind after minor alterations.

Header and footer text up to 15 lines long may be specified. When this option is selected, separate windows open to allow you to enter the text. Date, time and page numbers may be specified.

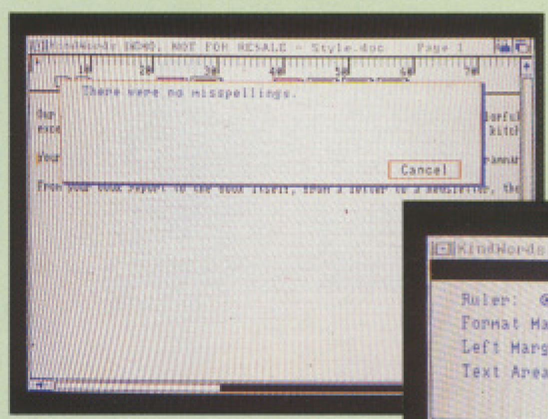
There are no facilities for using different header and footer text on odd and even numbered pages, nor is there any provision for turning them on and off at different stages in a document, although it is possible to suppress the header and footer on the first page. For a lot of purposes, this is barely adequate.

A find and replace option is provided, but it is not particularly fast and has only limited selection options, namely match case and whole word exchanges. I found the need to leave the search option to re-position the cursor after a search if I wanted to carry out another search of the same part of the text very frustrating. Backwards and global options would make life easier.

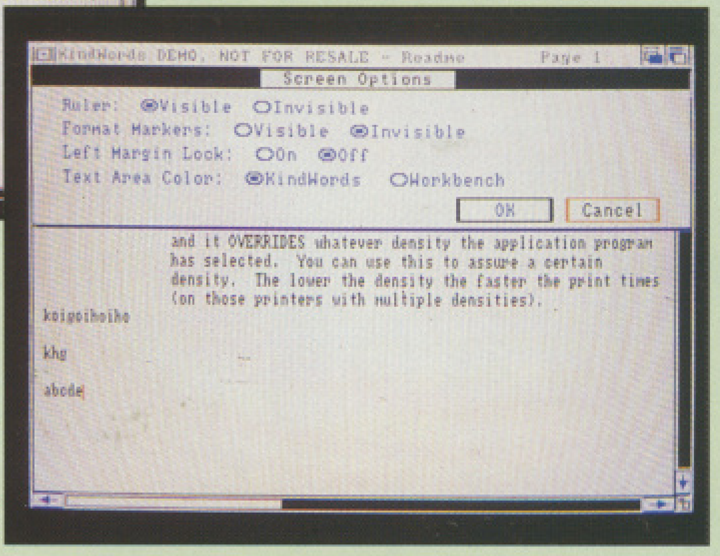
Once a match is found you may replace just the one item or all subsequent matches. Replace then find is the same as replace except that it automatically looks for the next occurrence. Find next leaves the current find unchanged and looks for the next match.

LOW, medium or high resolution IFF graphics may be inserted into documents. high resolution chunks being reduced to medium resolution. Graphics are displayed on screen and may be moved around and re-sized. You cannot insert text in the same areas. Being able to load graphics into documents is one of those features that I wonder how many people really use?

On occasions I found editing a document containing graphics caused odd things to happen. For no obvious reason, after carrying out some editing task in one part of a document the cursor would suddenly jump to a ▶



The spelling checker in action



Customising the text appearance

◀

completely different place and on a couple of occasions the screen was slightly corrupted. This problem could be minimised by inserting the graphics when the remainder of the editing was complete.

Text may be underlined, emboldened or italicised. You can either select the style and then enter the text, or you can mark a block of existing text and select the style required for that block.

I found that several of the combinations of these styles made the text almost unreadable on screen and would recommend that styles and fonts are selected at the end.

A SPECIAL feature of Kind Words is SuperFonts, which may be used with a suitable printer. Only a small range of printers is currently supported, but the manual says that further drivers will be included in the future. SuperFonts are also displayed on screen, but if you try using them with italic style the effect is sometimes almost unreadable in the 12 and 14 point sizes, the characters tending to overlap. Deleting a character often takes a bit off the next character as well.

Three point sizes (heights) of Roman typeface text are supported, 8, 12 and 14 point, with 12 being the default. Super and subscript are always 8 pitch characters positioned above or below normal text positions.

There is a problem with SuperFonts in that if you change font sizes in the middle of a line the text aligns along the tops of the fonts and the bottom is out of line – not the effect you would normally require.

The print option lets you specify the start and finishing page numbers plus the number of copies required. You must also specify the type of paper being used. There are a number of default settings to select, such as A4 single sheet or continuous standard stationery, and also a special size option.

The options are not as flexible as I would have liked. Final, draft or SuperFont quality output may be selected. Depending on the choice made, Kind Words will substitute the specified fonts for the printer's built-in fonts. If final quality is selected, for example, the printer's NLQ font will be used.

Draft quality uses fast, low resolution fonts and all the font sizes will appear as 12 point. There is no provision for fully justified proportional printing. While you could perhaps select proportional on the printer's DIP switches, it would be printed with a ragged right margin.

When printing using SuperFonts, the speed is very much reduced, although the result is very acceptable from even a 9 pin dot matrix printer.

If the document contains any graphics and you have a suitable colour printer, these will be reproduced in colour.

The spelling checker is not really one of the best features of the program for a number of reasons. The dictionary contains about 90,000 words, so we are told.

The first time the checker is called, it asks whether you want to load the dictionary into memory. If you have expanded memory, the answer is a resounding yes, otherwise checking is painfully slow.

A message tells you that checking is in progress, but otherwise there is no indication of what is happening, or how far the check has progressed.

If a word isn't recognised, another window opens and you can either edit the word to correct it or click on one of several options to ignore, add word to dictionary, replace or ask for suggestions. This lists alternative words that Kind Words thinks you might have intended. You can select a word from the list, and this will then appear in the editing box. Finally you insert it into the document by clicking on the Replace box.

THE dictionary is American, complete with "color", "center" and all those other americanisms and words ending in "ize". You can add your own words to a custom dictionary, so there is no problem with teaching it English, but there are no facilities for removing incorrect, or unwanted, words. I think an English dictionary should be one of the priorities together with some dictionary maintenance options. There appears to be no facility for checking with, or creating, alternative language dictionaries.

Basic mail merging facilities are provided. Wherever you wish data to be inserted you use a merge word – their terminology, not mine. This is a word wrapped in double opening and closing angle brackets. For example, you might use <<name>> and <<address>> wherever you wanted the name and address inserted.

You also need a merge list file, containing the names and addresses, or whatever you wish to merge into the main text. The first data record in this file must take the form of a template containing the merge words that were used in the main merging document. These must be in the same order and all subsequent records must consist of the same number of entries.

The disadvantage of this approach is that you cannot use data files exported from a database without first loading them and altering them to suit the required format. There are no facilities to manipulate the data in any way, nor to carry out any mathematical calculations. You will

get exactly the text that is in the merge list.

Most of the problems I encountered seemed to be connected with the use of graphics in a document and the display of different styles and fonts on screen, but they weren't generally dangerous, merely inconvenient, though I did encounter Guru Meditations on two occasions.

Sometimes I found that numbers didn't line up correctly with decimal tabs, but as soon as you deleted something they all jumped into line.

One feature of the program that needs some attention is the speed of operation. There appears to be an unnecessary amount of re-drawing of the screen.

This can be very long-winded as not only does the program draw the box and its contents, it also completely re-draws the remainder of the screen underneath the box, but twice sometimes. That, combined with the sloth-like screen update, leaves you waiting and wanting.

I found it very difficult to categorise Kind Words as while it contains a number of quite advanced features it also has some more basic limitations. It all depends on what you require from a word processor. If you want to carry out what almost amounts to very basic desktop publishing (sorry, not multi-column), then Kind Words may be ideal.

For my purpose, which is primarily creating large quantities of text, I would willingly do without the graphic and SuperFont features in exchange for the ability to have more than one document open at a time, column as well as block mode editing, more flexible headers and footers, not to mention a bit more speed.

To call Kind Words a fully featured or professional word processor is stretching things a bit and I would describe it as a fairly standard word processor containing a number of more advanced graphics facilities.

If your text editing needs are not too complex, or you have to incorporate graphics into your documents, at the price it may be considered good value for money.

REPORT CARD

Turbo Silver
Impulse/HB Marketing 0895 444433
Impact Animation 010 4969419971 (Germany) £149

USEFULNESS
Everyone needs a word processor, but this is a bit short of real features.

EASE OF USE
Easy to use, but the lack of permanent configuration changes makes work. Intuition 11 A proper multitasking program, probably written using a C compiler.

INTUITION
A proper multitasking program, probably written using a C compiler.

SPEED
Editing speed is mediocre due to screen handling and 'fancy' printing is slow.

VALUE
Cheap enough, but lacking in features and flexibility.

OVERALL 60%
Has potential, but needs further development.

STARGLIDER 2 – the Egrons strike back



The most awaited sequel in Amiga history is finished. Simon Rockman takes his Emma 2 scout car to Millway in final pursuit of Egron destruction

AFTER being routed in Starglider the Egrons retired to lick their wounds and prepare for a second onslaught against Novenia. The second attack involves them building bases on the seven moons of Millway, a gas giant in the solar system of Solice.

The bases are a staging post for a huge space station, built in orbit around Q-Beta, the moon of the outermost planet in the Solice system – Aldos. Your mission is to destroy the space station along with its cannon, a weapon which is capable of firing through the vacuum of space and penetrating the ionosphere of Novenia to wreak havoc on your home planet.

Jaysan, Katra and Agro have the task of defeating the Egrons. You again take on the role of the space samurai. It is a feat which requires skill, courage, dexterity and Jaysan to get out of the bath.

The AGAV from Starglider was an old ship when you used it years ago. For this mission Draggon Industries – designers of fine spacecraft – have prepared the prototype of their Interplanetary Combat And Reconnaissance Universal Scout. Icarus for short.

For this mission "prepared" means that the engine, designed by specialists on the planet Cosworth, has been tuned and the craft stripped of all armaments save a simple gas plasma laser. With its PicoChannel expansion bus the Icarus is capable of taking more advanced weapons, but Solice is a long way from Novenia and the fuel load precludes the fitment of more advanced weaponry.

There are four bigger and better types of whizzbang which can be mounted on the Icarus. Time-warp cuboids take twice the power of a standard laser, but pack a much more significant punch. They flip parts of the target into a different time. Fire and Flee missiles are the Icarus' answer to heat-seekers. They rely on a sophisticated Target Identify Mode (TIM), because relying on heat would be fickle when you have to cope with the temperature extremes on the hot planet of Dante and the ice wastes of Aldos.

TIM relies on determination as much as intelligence. The missiles are often led a merry dance before they destroy the target, something which can be quite amusing to watch and makes you trigger happy.

Barnes Wallis wouldn't recognise the Humbug as his sort of bouncing bomb – for a start they spin the wrong way. They are humbug coloured and can destroy virtually all armour.

The most powerful weapon is the neutron bomb, which hangs Dark Star-like below the Icarus. As the mission briefing tells you: "This is the only weapon in existence with enough force to destroy the Egron space station and safeguard the

future of Novenia".

Before you can mount your assault on the space station you need to build the bomb. This is where your flying skills are called into play. The Icarus' initial planetfall is on the geosphere of Apogee. This planet is the place where the neutron bomb will be built.

Dive into a tunnel entrance – the planet has holes drilled through it to speed journeys from place to place – as the tunnels are the safest place to be. The Egrons have not invaded them and they are the hiding place of the rebel forces. You have to enlist the help of the rebels to build the bomb. They will be expecting you.

The tunnels are twisty. You will learn your way around after a while, but getting lost can be really frustrating. Black panels on what for the sake of convenience we shall call the floor, indicate a depot nearby.

TO get to the first depot go left at the first two forks in the tunnel. Then when a tunnel merges from the right turn around and fly to the left down the merging tunnel. This will bring you to the depot.

The manager, Trem, will give you a shopping list – things to get from other planets to help make the bomb. This consists of a case of Vistan wine, a crate of nuclear fuel, a crate of castrobars, a lump of mineral rock, an Egron mini-rocket, an asteroid, a cluster of nodules, a flat diamond and Professor Taymar, who will build the bomb.

Finding out where to get the parts of the bomb is the strategic element of the game, and a good reason for reading all the documentation. Some things seem obvious. A case of Vistan wine comes from the planet Vista, asteroids can be found in the asteroid belt between Millway and Apogee.

Castrobars come from Castron – the sugar moon around Apogee. They are Professor Taymar's favourite nosh and the reason he is prepared to build the bomb. But you will run into trouble if you have the Castrobars on board when you pick him up. Castron will not give you the food, you need to trade a petrified tree. This is a good place to start. Castron's twin – Enos – is a dark place, famed for its petrified forests.

When the game starts lift the nose of your Icarus and apply full thrust. This will take you out of Apogee's atmosphere and into space. Watch out for space pirates; assuming the coast is clear reduce thrust to zero – there is no point in wasting fuel cruising around.

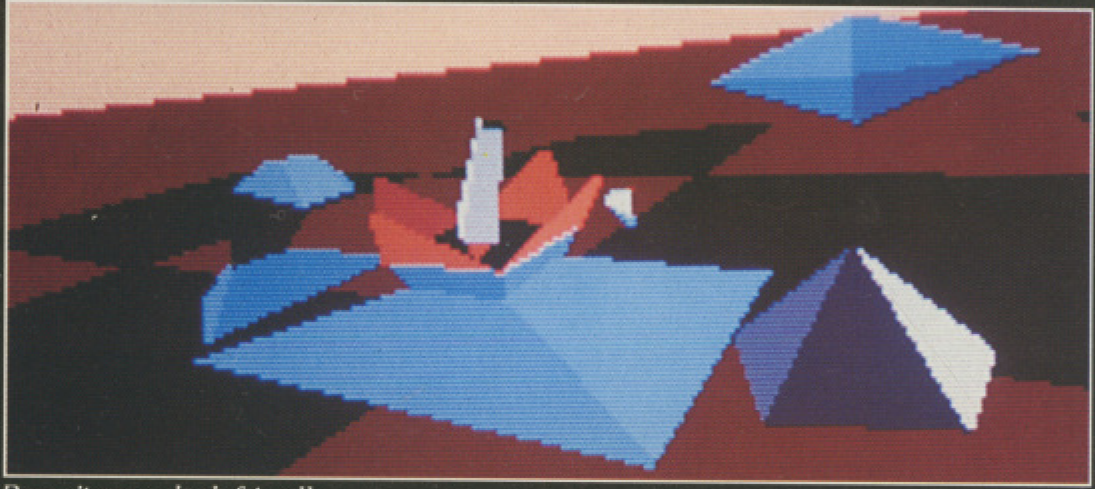
Use the identification computer to find Enos – it is the dark grey moon. You will learn your way around with some practice. Point your nose at Enos and engage stardrive. When the moon fills the screen pop out of stardrive for planetfall. Hitting the surface too hard will damage your shields.

Enos is a violent place, so find a tree as soon as possible. Grab it with your tractor beam and suck it into the craft. The hold is large enough to take three objects, so a bit of juggling may be needed to decide what to take and when. With the tree inside leave the planet and head for Castron – home of the dentists.

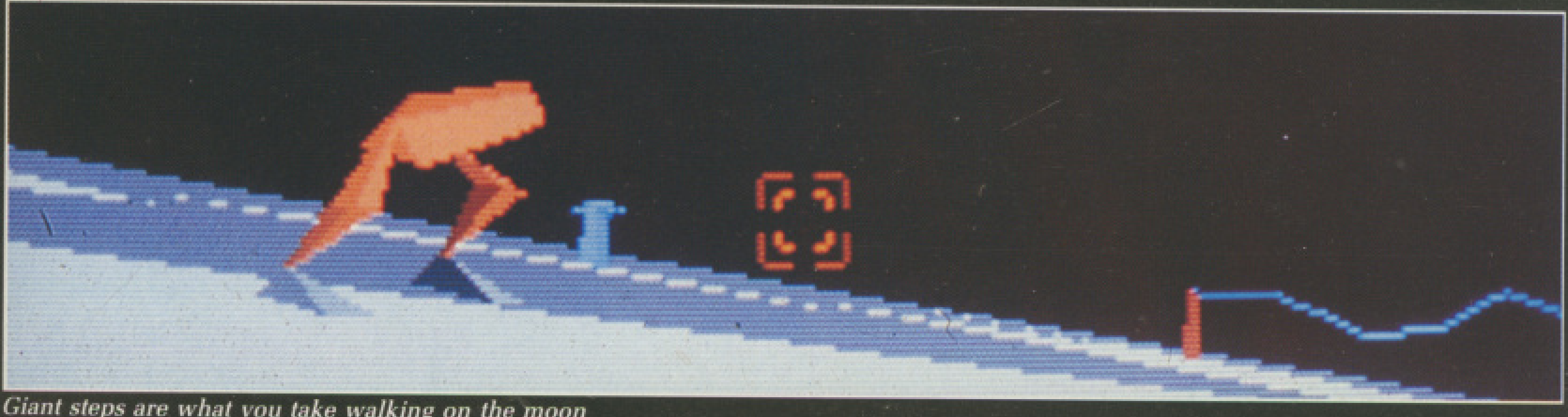
Back in space you are likely to find marauding pirates. Depending on the state of your energy reserves you might choose to tangle with them. Their catamaran craft are agile but fall to your laser fire. The blue spaceships weave, and are the hardest thing in the game to hold in your sights. A missile works, but is a waste of ammo. Ridding the spacelanes of pirates not only performs a judiciary function, the wrecked bounty hunters might drop some cargo, providing a short-cut to your goal. Retrieve the goodies by flying towards and capturing them in your tractor beam.

Dicing with death like this is bound to have brought your defences down a notch or two. Time to refuel. By far the easiest way to do this is by sucking energy out of the asteroids.

Fly between Millway and Apogee ▶



Doesn't space look friendly



Giant steps are what you take walking on the moon

◄

and look for the lumps of blue rock. Bring the Icarus to a halt close by and grab with the tractor beam. As you watch the control panel the readings will rise.

Asteroids are unstable, as anyone who has played SiniStar in the arcades will know, and after a while the rock starts to shimmer and will explode. You may have to find several asteroids before you are fully re-fueled.

Refuelling is an important part of the game. There are powerlines, similar to those in Starglider, held aloft by pylons. Fly along them to suck in the power. You can refuel Elite-style by scooping energy from the sun – but beware, remember what happened to the original Icarus. You too will melt – quite spectacularly – if you fly too close to the sun.

Dante – the hot planet, is a good source of power. Volcanic activity means you can suck energy by hovering over the mountain of fire, or look out for geoplasmic emissions from the planet surface. Catch one just right to refuel. Take thrust up to maximum and leave Dante. *E quindi uscimmo a riveder le stelle* (Thence we came forth to rebehold the stars.) Find a tunnel entrance as soon as possible – you don't really want to do battle with the Egron might. Flying through the maze of tunnels can be frustrating, but when you find the right depot you may well come across a supply of Humbug bouncing bombs. Great for taking out planet-bound Egron hardware.

LEAVING Castron you may well decide to investigate the Space Whales in the gas atmosphere of Millway, or look for Professor Taymar who is driving an Emma 2 on Broadway. You might decide to take on a space train or dice with pirates, but whatever you do be careful. The Icarus' computer can "listen" to alien noises and identify craft – so if you hear a strange noise the computer will determine for you whether it is friend or foe.

Novenia will send messages which appear on your microscreen telling you what is going on in the rest of the system. Messages like "Egron station constructed on Apex" are useful – take a humbug and see to it.



Your craft casts a shadow on the alien soil

Whatever you do, be careful out there. If your Valium Dynamics fuel cells deplete to zero the Icarus will explode, leaving the pilot's chair to bounce on through space. The chair is the same shape as the one Alister Perrot programs in at Argonaut Software, and was designed to check out the graphic routines.

What we want to know is, if the chair can withstand Egron rockets and the destruction of the Icarus – why don't they make the spacecraft out of the same stuff as the chair?

Starglider 2 mixes plot with the gameplay in a way no one else has yet achieved. Interceptor and Carrier Command have come close, Starglider 2 excels. You really feel as though you are on a mission from Novenia.

Argonaut has produced astonishingly fast graphics, with a checkerboard planet surface. Your craft casts a shadow on the alien soil. The colours are bold and the action furious. When a spaceship explodes it does so spectacularly.

You can select Interceptor style external views of your craft – only really useful in tunnels – and look at the ship from any angle. You can view the outside world from any angle and lock the axis through which you tilt. All this can get confusing, but hitting 8 on the numeric keypad restores normality.

Richard Clucas is justifiably proud of his work which has produced the Argonaut Disc Loading Scheme (ADLS). This allows the same disc to be used in both an Amiga and Atari ST. The program does not have to be cut down in size, because much of the information is shared by both machines.

The save game option works in ADLS, specially formatting a disc to hold up to five games. If you have a particularly good saved position you can give the save-game disc to a friend who can load it into his ST.

While the Amiga version is a mite slower than the ST it sounds a million times better – the Atari does not have the sound facilities to compete, although both machines have Dave Lowe's stunning soundtrack.

The monochrome ST version looks good, and a PC version is under development with C64 and Macintosh versions planned.

IN addition to the game, Starglider 2 offers a futuristic painting package. Arcade addicts who saw the I Robot machine will remember it offered a painting option. Starglider 2's option 8 – Paint with Rolf – allows you to use any of the 3D shapes from the game as a paint brush. It was incorporated after a bug caused the shapes to freeze on the screen. While it is fun no one would accuse "Painting with Rolf" of being art.

Whether you are painting or shooting Starglider 2 is the kind of game the Amiga deserves. You deserve to play it.

REPORT CARD

Starglider 2
Rainbird/Argonaut
£24.95

Sound
Whizzes and crashes which only the Amiga makes possible.

Graphics
Truly state of the art 3D. Nobody does it faster.

Gameplay
Shows how shallow the original Starglider was.

Value
The highest score yet in Amiga Computing.

OVERALL 96%

Give yourself a treat – buy it!

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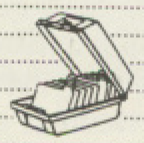
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Amiga Arcade

STIR CRAZY

INFOGRAMES has made a slow start in the Amiga market having only released the Passengers On The Wind series, but now with its latest game, Stir Crazy, which features the hilarious Bobo, has finally emerged as a real force in Amiga entertainment.

The game is set in the peculiar prison Inzeeslammer which makes the inmates behave childishly. Bobo, the star of the game, is the oddest inmate, having been locked up for 17 years. He tries everything to escape and sometimes manages to do so, but his new found freedom never lasts very long.

A comprehensive menu allows for up to 10 players with each protagonist selecting the events they wish to play.

Stir Crazy is very similar in concept to the classic sports series from Epyx, based on the antics of a prison inmate rather than sporting achievements. The program is divided into six separate sub games which can be played individually or collectively.

The first event takes place in the canteen and like all prison inmates, Bobo has to take his turn at table duty, Ensuring that all the hungry prisoners are fed. They arrive one after another in a state of starvation, which means that most require a second helping. If you do not serve the convicts immediately be prepared for a quite hysterical scene as they plaster poor Bobo with the soup of the day.

The second event finds Bobo peeling a pile of potatoes which gradually gets bigger as he goes along. If you are silly enough to try and throw a half-peeled potato into the pile you are instantly accused of shoddy workmanship and the halfpeeled potato is thrown back. This touch of humour is well illustrated and I guarantee that after a while you will be deliberately sending half peeled potatoes into the pile just to see Bobo punished.



Feed your fellow convicts or there'll be trouble

Having prepared the potatoes, the next event takes Bobo to his third chore – washing the floor, the job he likes least. The other prisoners walk on the floor and leave nasty footprints for Bobo to clean. Occasionally a dog will run past leaving a muddy trail of footsteps which must be cleaned before the prison warden inspects the floor.

The fourth event is my favourite as Bobo tries to help his fellow inmates escape. The prisoners take advantage of the warden's tea break and try and get free by jumping from their cell windows. Bobo must move a trampoline and catch them at the right angle so they can fly to freedom. If the angle is not right then the prisoners smash into Inzeeslammer's walls and see stars.

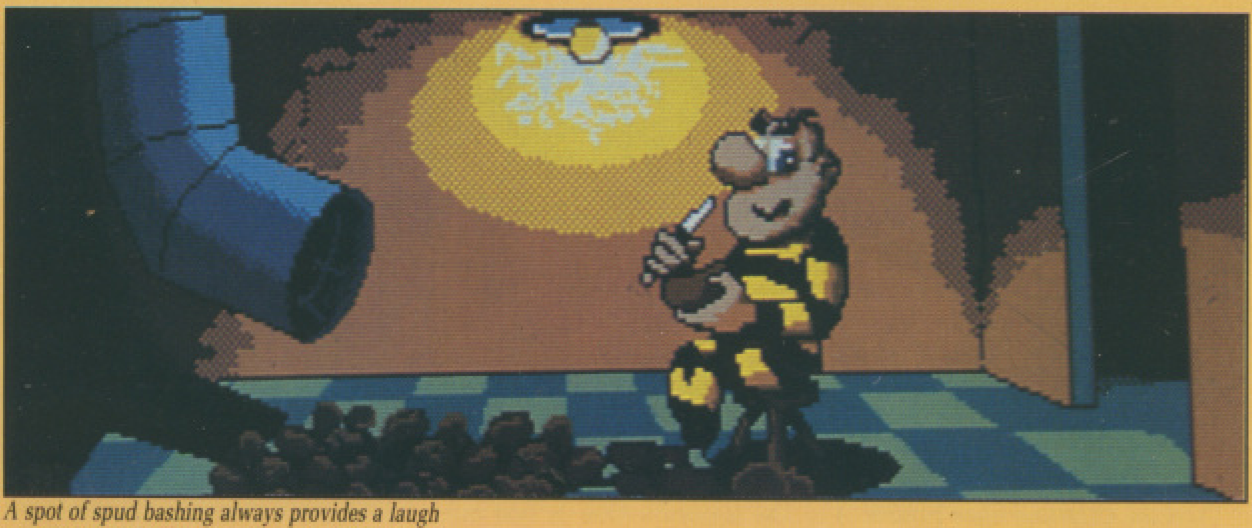
Event five features Bobo, having escaped, running across three electrical wires where he must avoid the sparks and collect green cylinders. The action is fast – perhaps a little too fast – and most of the time Bobo is electrocuted in spectacular fashion. Being electrocuted has never been such fun. The destructive nature of the game is put aside as the humorous touches make you see the lighthearted side of 240 volts.

Stunned and eventually recaptured from his live wire trip, Bobo's final task is to make sure that the other five prisoners with whom he shares the dormitory, stop snoring and allow him to get some sleep. The only way to silence them is to give them a gentle nudge so as not to wake them.

Stir Crazy is a thoroughly enjoyable game packed with humorous touches. The graphics are top notch cartoon quality and the sound and music some of the best to be heard on an Amiga.

If that's not a good enough recommendation then you shouldn't forget that the game also features the zany Bobo, who could just become one of the mega stars of computer entertainment.

Gary Wilson


A spot of spud bashing always provides a laugh

Stir Crazy
£19.95
Infogrames

Sound	
Graphics	
Gameplay	
Value	

Overall – 67%

THUNDERCATS



Take Lion-O to your small screen in this excellent conversion

FROM the BBC TV series of the same name comes this tough hack-and-run game from Elite. The background story is that during an attack on the Cats-Lair by the malicious Molemen, servants of the evil Mumm-Ra kidnapped a handful of members from the Thundercats team.

Even worse, the kidnappers also stole the Eye of Thundera and, as we all know (don't we?), this charmed jewel holds the magical power of the Sword of Omens. Note the prevalent use of capital letters, essential for tales such as this.

The hero, Lion-O, was out to lunch when the raid took place, but has vowed to go to Castle Plundar to rescue the Eye and free his mates. Your job is to steer Lion-O safely through forests and underground caverns, duff up the baddies, rescue the lads and recapture the jewel.

Thundercats is a little like Psygnosis' Barbarian, a horizontal running, jumping, slashing and grabbing arcade adventure with enemy attackers coming non-stop out of the woodwork. Unlike Barbarian, it has continuous scrolling which makes for fast and furious action.

Whenever Lion-O is touched by an attacker – they come at him from



The Joes come in different sizes

both sides in what sometimes seems like a never-ending stream – he falls over, disintegrates and so loses one of his several lives. Fortunately for the gameplay, he is not placed right back at the beginning, but just past the spot where he was hit. Once all of his lives are used up Lion-O has it all to do again.

The foes come in different sizes. The tall eagle-beaked ones can walk over any large object and from them there is no hiding place. The titchy Molemen who are blocked by obstacles such as huge rocks, can be jumped over or sliced with the sword if Lion-O goes down on one knee.

There are numerous other hazards such as gaping, water-filled pits. Leaping over one of these and landing slap-bang on an enemy on the other side happens all too frequently, so lightning reflexes are essential.

Bonus lives and points can be earned by leaping up and sword-swatting various containers dotted around the landscape, usually high up in trees. Even better, some containers hold a weapon which, when the vessel is clouted, replaces the one Lion-O currently wields.

Weapons which are effective at long range are clearly very welcome in a game when the enemy has an inexhaustible supply of troops.

The signature tune is first rate, catching the mood of the game just right; other spot effects add to the pleasure.

The graphics are colourful and fairly detailed, collision detection is excellent and the animation impressively smooth and realistic.

The pace very fast and the whole game a very tough challenge – perhaps just a shade too tough for those who are not so nimble with the joystick.

Anyone who likes fast-moving and testing leap-and-slash games should certainly enjoy this one. Thundercats is an impressive conversion, the best of this particular game for any home computer, and bodes well for further Elite products for the Amiga.

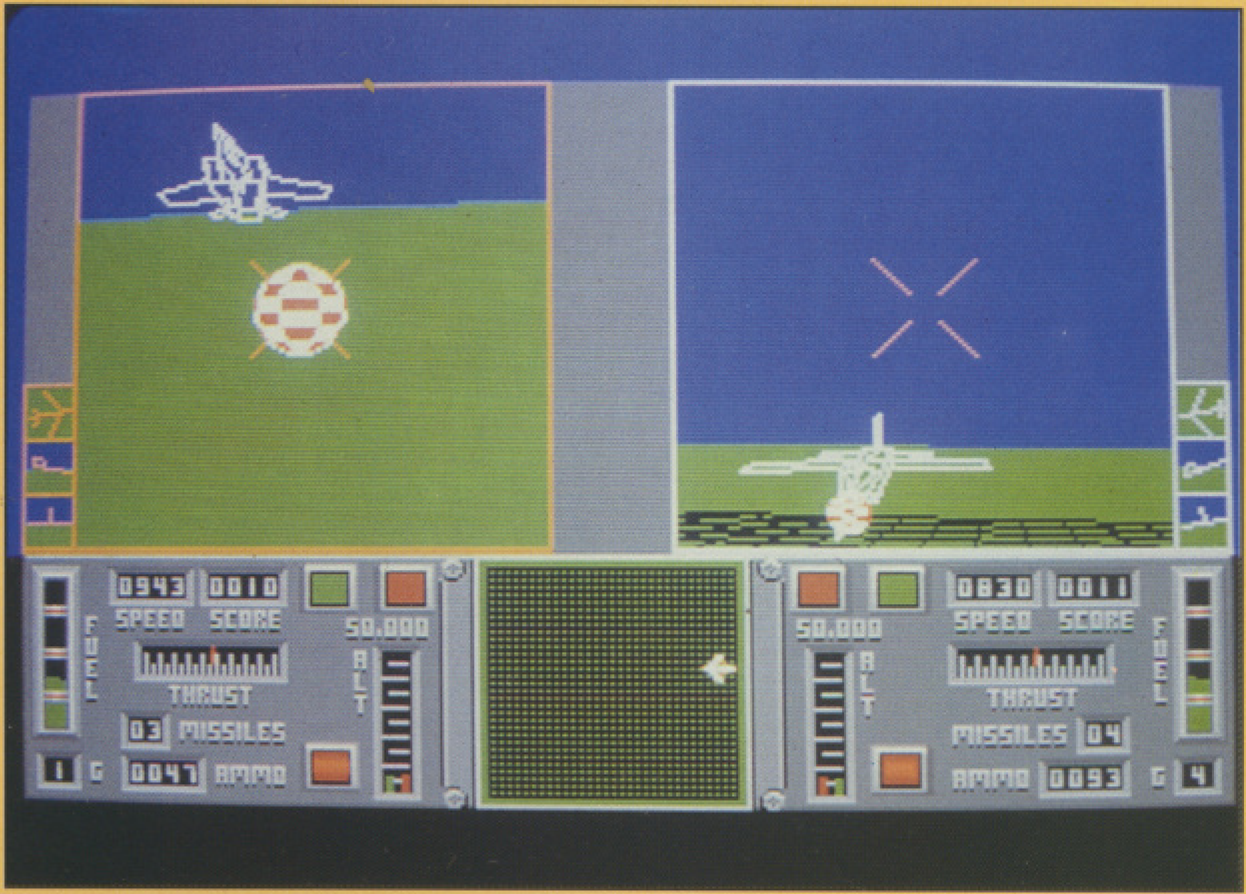
Bob Chappell

Thundercats
£24.99
Elite

Sound
Graphics
Gameplay
Value

Overall – 85%

SKY CHASE



A fast, furious and pretty enjoyable chase through the sky

IS there life after Interceptor, the game which apparently has it all? Surprisingly the answer is yes. That erstwhile Electronic Arts program treads the middle ground between flight simulation and airborne combat game, with Flight Simulation II cleaning up on the straight simulation front.

Sky Chase is one of the first releases from Image Works, the new Mirrorsoft label and is very much in the Top Gun mould of airborne conflict. "Never mind the realism, count the bullets" is the order of the day here.

Never mind the plot or objective either, in this game the action starts with two opponents – any combination of human against computer simulated players – hurtling towards each other. As soon as the planes cross control is handed over to the pilots and may the best Tom Cruise lookalike win.

Each player has an independent three dimensional view, with fast moving wire frame graphics. Well they are fast if you don't select the complex terrain grid from the host of options, and let's face it, there isn't much of the screen being manipulated. There is no hidden line removal, so the graphics should be fast.

All the parameters are variable, and range from giving you a choice of fighters, F/A 18 Hornet, F-14 Tomcat, F-15 Eagle, F-16 Falcon on the American side or MIG-31 Foxhound and MIG-27 Flogger on the USSR side, to tinkering with weapons supplies, timings and the effects of G force.

The action continues, with a brief pause every time a player gets nailed, until one player runs out of fuel, the winner being whoever has scored most points. This means that if you shoot your opponent more times that he shoots you you're laughing.

But there is the problem of the ground. It's hard. Hitting it full speed is not only painful, it hands over points on a plate. Equally climbing to over 50,000 feet or flying beyond the terrain boundaries have a similar result.

A quick peek at the weapons supplied for this modern duel in the sky tend to support the assertion that this is simply a fun flying game. Your super advanced piece of Air Force real estate has twin cannon and the ability to launch missiles. The witty chaps who coded Sky Chase have made these look like Amiga bouncing balls.

Your only defence against these twin threats is speed and manoeuverability. Either use them or find broken bits of plane showered across the screen. Even on the easy level the computer flyboys are a tough bunch.

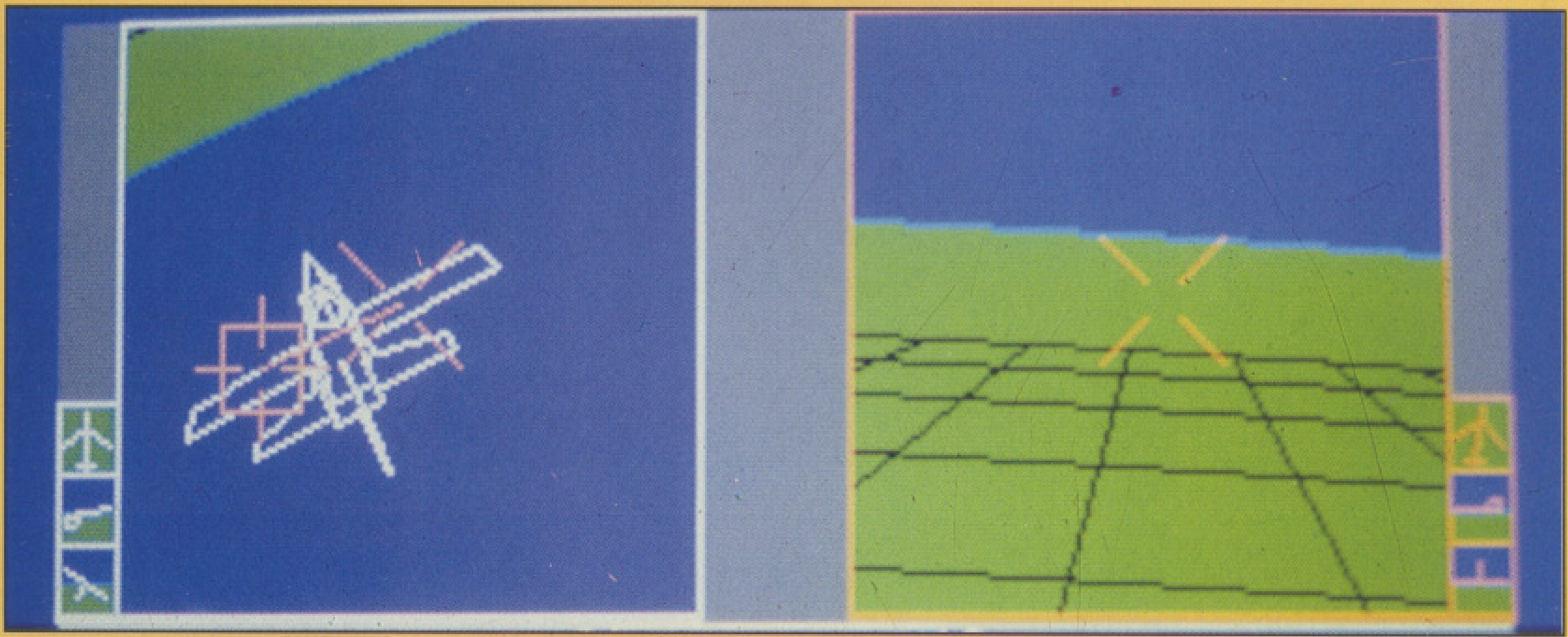
The appeal of downing faceless opponents, especially when the explosions – unlike the rest of the effects – are so wimpish, tends to pale before long. Drag a comrade into the fray though, and the fight becomes that bit more personal, that much more fun. On this level the slightly dated look to the graphics doesn't detract from the fast, furious, and pretty enjoyable, chase through the sky.

Mark Luckham

Sky Chase
£29.95
Image Works

Sound
Graphics
Gameplay
Value

Overall – 65%



Each player has an independent 3D view with fast moving wire frame graphics

WORLD TOUR GOLF



The main screen and its two views – from above and behind the golfer

TIME to don the brightly-coloured jumper, snazzy slacks and sure-grip glove, give a quick shout of "Fore!" and drive off the first tee with this new and eminently playable golf game from Electronic Arts.

Until now only three simulations of this great sport have been available to satisfy the appetites of Amiga links addicts. Accolade's Mean 18 was a worthy attempt but was let down by rather weedy graphics, while Gamestar's Championship Golf, although technically a clever simulation, featured only one course and was far too complicated and fussy for its own good. Leaderboard, is perhaps the best; a massive selling golf game on other micros, it hasn't quite made the same impact on the Amiga.

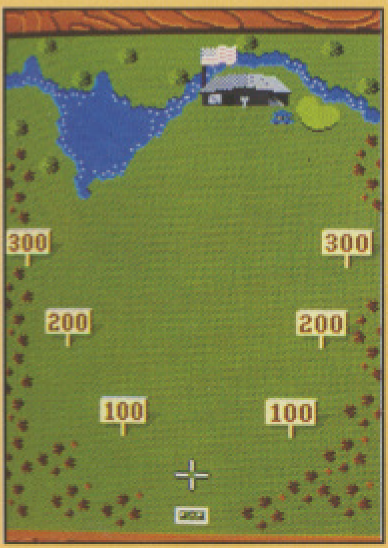
Electronic Arts' World Tour Golf seems to have got the mix just about right. The game is a pretty fair reflection of the intricacies and challenges of golf yet at the same time manages to be addictively playable.

It can be played using either mouse or keyboard, by up to four players. The main playing screen is divided vertically. The left half gives you a detailed overhead view of the entire hole while the right is from just behind and a few feet above the golfer, starting from a point where the player's ball currently rests and looking towards the green, or hole, if on the green. The line of aim can be adjusted and any club selected for the shot – on request and as a guide, the club's range is indicated by a circle radiating out from your ball on the overhead view.

A small dial – the swing meter – allows you to gauge the strength of the shot and whether it will go straight or otherwise.

It's simply a matter of being quick with your trigger finger to stop the two hands of the dial at the right points (well, maybe not so simple judging by some of my violently sliced shots).

Displayed in a continuously updated panel at the top of the right-hand picture are such relevant items of information as the name of the course, the number of the hole and its par, and your name and score for the round so far.



A drive in the country

Some of the panel data is particularly vital – distance to the green, strength and direction of the wind, and the lie of your ball, ranging from perfect to plugged. All these factors must be taken into account when deciding what club to choose and in playing your shot.

The game has generous customisation options, allowing you to tailor players' skills – tendency to hook or slice, driving distance and accuracy, and recovery from bad lies – amend names and adjust handicaps.

There are over a dozen courses to play on, some simulating the real thing like St Andrews and Augusta, some imaginary like the devilish Par 3 course. World Tour Golf has its own easy-to-use construction kit which lets you edit, design and save as many courses as you wish for future play.

The animation of the small golfer as he swings and hits the ball for you is realistic, although the flight of the ball is less so, particularly when chipping from near the edge of a green. I know my ability to put backspin on the ball is world renowned, but even I couldn't make the ball stop as suddenly as this one does at times.

The graphics are slightly more stylised than I would have hoped, given the Amiga's capability, but are certainly effective enough. Digitised sound effects – swish and thwack of club, splat or splash of ball in bunker or water, cries of congratulation or commiseration as your ball finally disappears into the cup – all enhance one's enjoyment. Small, novel touches like the spurt of sand as your ball buries itself in the bunker or balloon messages coming from the golfer's mouth add to the fun.

This is a first rate golf simulation. Even compared against the standard-bearer Leaderboard, World Tour wins by several strokes. And no matter if you don't know one end of a four iron from the other – you'll find this game easy to get into yet providing all the addictivity and challenge of the best of games.

Bob Chappell

World Tour Golf
£19.99
Electronic Arts

Sound
Graphics
Gameplay
Value

Overall – 69%

BETTER DEAD THAN ALIEN



ELECTRA is a new name in software development and if its first release, Better Dead Than Alien, is anything to go by the company could have a very prosperous future in Amiga entertainment. The game is anything but sane, just take one look at the name and you know that the people who designed this game have an interesting sense of humour.

This is a weird yet wonderful shoot-em-up is based on the daring antics of lone space hero Brad Zoom in his quest to save civilization (as we know it).

You must join Brad and armed with his super-zapper wage total war against alien hoards. As you may have already guessed, Better Dead Than Alien is a vertical scrolling shoot-em-up. And what isn't these days? But there are enough touches of humour and innovation to make it stand out.

When I first loaded the game I instantly thought to myself "Oh no, not Space Invaders revamped". The game starts slowly but as you progress through the 25 levels it throws new twists into the action. It will succeed in hooking you to such an extent you'll be playing for hours.

Enhancements are included which provide a little more variety than most shoot-'em-ups. Check out the cool super-bolts that obliterate everything in their vicinity – totally rad.

The graphics, adequate at best, are well animated and are more than sufficient for this type of game. Audio effects – like the graphics – are mediocre with some nice touches like the digitised grunts and groans when Brad gets hit by an alien.

The game was developed as a spoof and as a result the programmers may have neglected the important aspect of lastability.

Gary Wilson

Better Dead Than Alien
£24.95
Electra

Sound	
Graphics	
Gameplay	
Value	

Overall – 48%

GIGANOID

FIRST there was Pong, then there was Arkanoid and now there is Giganoid from Swiss Computer Arts. This time it is set in the year 2758 when the galaxy is ruled by a powerful masterdemon. You must battle your way through 50 mazes to the final confrontation with the grandmaster of power. When he is destroyed peace can once again be restored to the universe.

The 50 mazes are composed of a variety of multicoloured bricks which must be hit with your ball until they are knocked out. After destroying all the bricks you continue to the next level where you are either faced with another level or a battle with the demons.

The demons form a bonus level in which you must return the balls they fire at you. Success in this rather difficult task is rewarded with the chance to skip up to four levels, depending upon how many balls you managed to return.

At various intervals you are also required to fight larger demons similar to the one at the end of Arkanoid and, of course, on the final level you must destroy the master of power, who is very similar to earlier demons but much,much harder to defeat.

As in the original, we are blessed with a variety of tokens which give the player different powers, including twin balls, lasers, slow ball, level skips and bonus lives. These tokens are much harder to obtain than in Arkanoid, because they fall to the bottom of the screen very slowly. And at exactly the moment you need to catch the token the ball is also speeding towards the ground and oblivion.

The Giganoid graphics are better than in the Arkanoid. Both the backgrounds and the sprites are excellently shaded and the animation is of a very high standard, if a little slow. Sound effects during the game are sampled and reflect the general happy atmosphere.



The programming is good and bug free. Even the hi-score table is innovative and stylish. If you were one of the few who didn't buy the popular and famous Arkanoid I can strongly recommend that you should go for Giganoid instead as it offers much more long term interest and a higher standard of gameplay, graphics and programming.

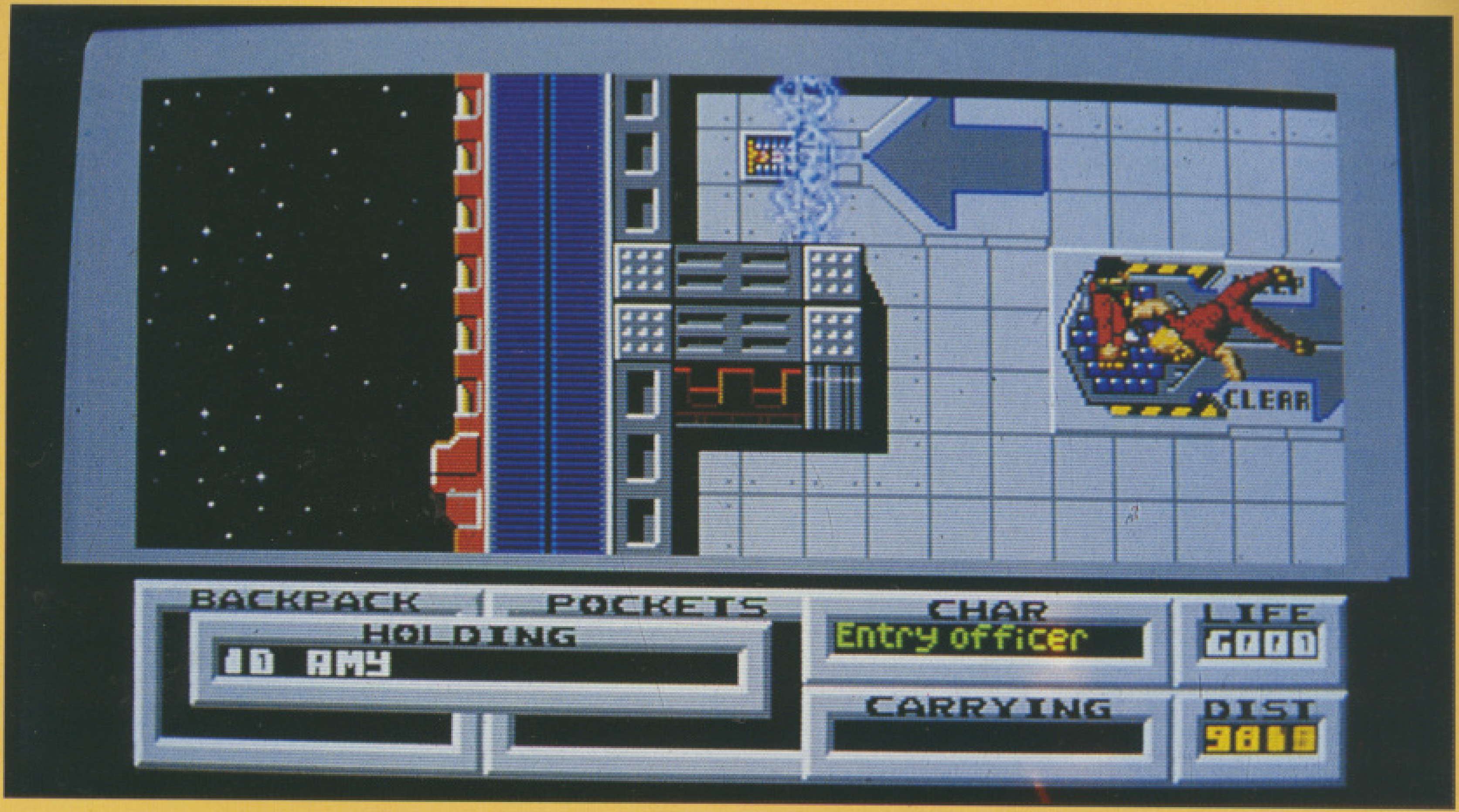
Mike George

Giganoid
£14.95
Swiss Computer Arts/Microdeal

Sound	
Graphics	
Gameplay	
Value	

Overall – 77%

PANDORA



A good start – in the brig of spaceship Pandora

THE spaceship Pandora – a generation ship in which colonies grow and produce everything they need – has completed its 200 year mission. Still, after all this time the ship is bound to be empty. Someone has to board it and strip it of the alien artefacts it has collected on its voyage through the galaxies.

That someone is you, but as soon as you beam aboard you realise that something has gone wrong: The 200 year old defence system is still active – move and you will die instantly. But move you must – the ship is going to release poison spores on the earth unless you can set the self destruct.

This gives you a set of objectives: Find as many alien artefacts as possible and drop them into the eject chute, Find the self destruct and set it, and find the escape ID and get off the ship before it blows.

No-one, including you, can move on the ship without an ID. Fortunately, an entry officer runs up to you and hands you hers, though this means instant death for her. A touching sacrifice. For the record, the entry officer was called Annie in earlier versions but in deference to the Commodore 16 blitter she is likely to be renamed Amy.

Wandering around the 2D game you will encounter a host of aliens, not all of them unfriendly. How you react to one will affect how others will react to you. For example, you may trade with characters, but not very successfully if you have killed other popular characters. If you have wiped out evil creatures – such as the bank manager – then you are more likely to be trusted. There are clues to how popular the aliens might be in the locations where you meet them.

In your quest to collect artifacts you need to learn how to deal with individual characters. This may mean picking up the right ID. There are four levels of clearance. Alpha, delta, pi and omega. They work in ascending order, so you can go everywhere with an omega pass. However, the exit pass has no clearance.

If you have made yourself unpopular you will have to fight the other characters. With a gun you can attack them from afar, and indeed you have to use this to attack the thief – he will steal your weapon in hand to hand combat.

The fight scenes are great, a cross between a scrap in Tom and Jerry and an old Batman programme, complete with BIFF! and WHACK! captions. To fight a character you need to be holding a weapon and advancing. A power meter helps you time each strike.

Weapons have different strengths and speeds, while the characters also have varying stamina and swiftness. Choosing the right weapon helps, as does having the kryptonite which weakens all foes, though the more scraps you get into the weaker you become. You can recover your strength using the brain, but this only works once.

When the ship reaches Earth you can elect to play on. Your home is destroyed but you can keep on collecting artifacts and picking up points.

Pandora is the first major program from Shahid Ahmad, with wonderful graphics by Terry Greer and games consultancy by David Eastman.

The game's design draws on many sources: Wandering around the ship owes much to Hewson's Paradroid, the fighting owes something to Gauntlet and the scoring to Atari Star Raiders. Film buffs will spot references to Silent Running and the cult film Dark Star. Watch out for the Wackobrain which looks like the Dark Star alien and will tap its toes.

The Amiga conversion is bound to be the best. Shahid uses the blitter extensively, the music is by David Whittaker and the whole thing runs very much faster than on the ST. This will allow Shahid to give some more of the characters shadows and tweak the gameplay.

Oh, and make sure you check out what the musician is carrying.

Simon Rockman



Not everyone you meet is friendly

Pandora
Firebird
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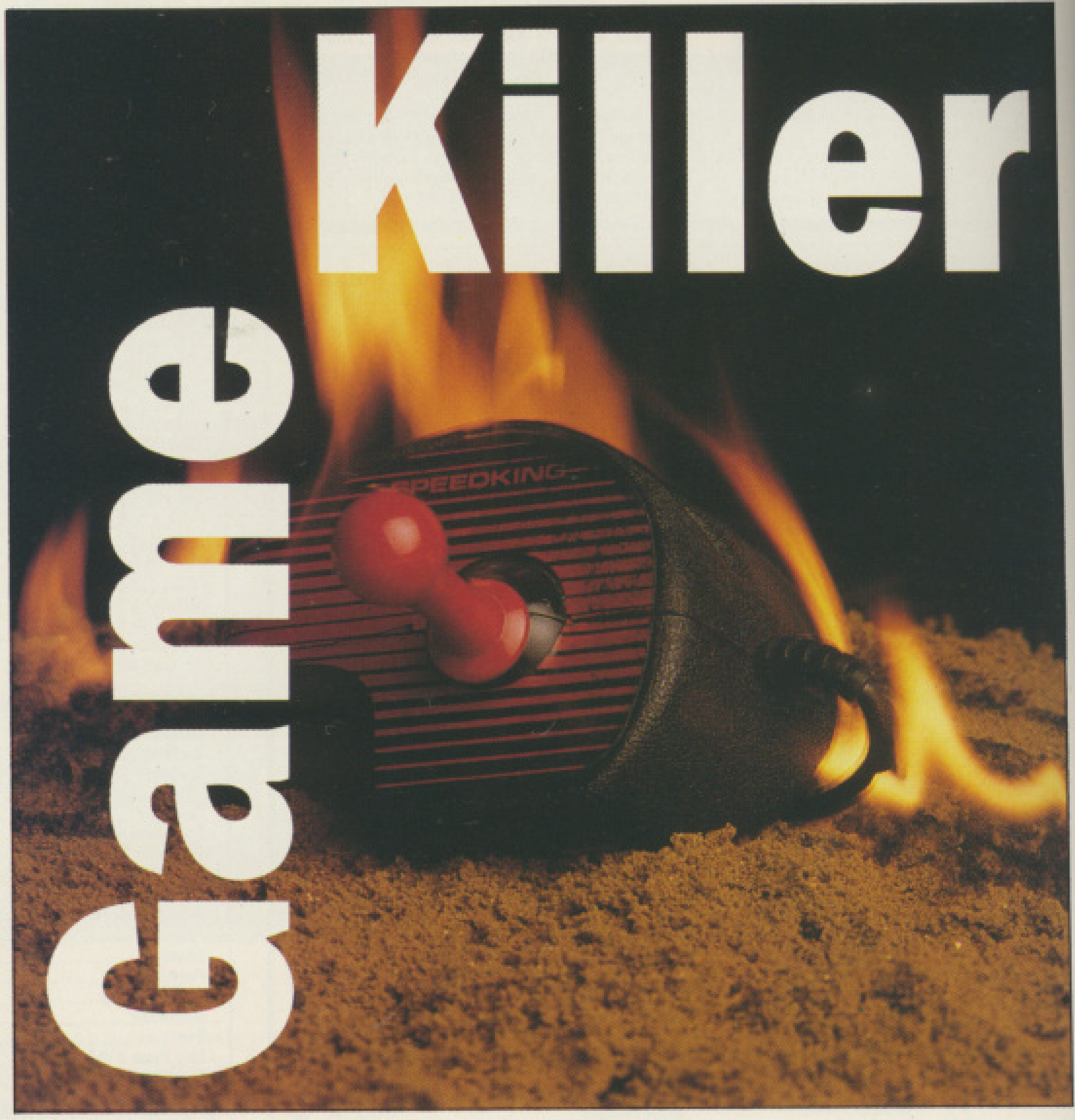
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Game Killer



Max "The Hacks" Tennant is the master of game play. Whatever the game he'll win at it, fair means or foul – often with a little help from his friends. If you have a tip for a game send it in. For every one we print we'll send you a game from our goodie drawer – together with a Konix Speedking joystick

A VERY handy tip for all the owners of ECO comes from Gordon Keenan, of Glasgow. If you press Alt + S simultaneously it will allow you to change the genetic code at any time and saves you having to run about finding food and a mate. The only fault with the tip is that it shows what an empty game this really is.

Andrew Retmanski, of Bulkington near Coventry, has a load of tips to offer for Psygnosis's Barbarian. He says that the bow behind the tinman is a fake, but you can still get the arrows. To kill the dragon, just fire two arrows at it.

To skip on to the next screen in Insanity Fight from Microdeal hold down both of the mouse buttons, the L key and press the fire button.

Andrew was one of several people



to point out that in Electronic Art's Test Drive you can easily improve cornering, by holding down the fire button, when your car will effortlessly glide around the mountainside.

For those players too busy to play cards in Hollywood Poker he offers advice to get a sneak preview. Insert Workbench disc and press Ctrl+D to enter the CLI then type the following commands:

```
MAKEDIR RAM:
COPY C/CD RAM:C
COPY C/DIR RAM:C
COPY C/RENAME RAM:C
ASSIGN C: RAM:C
```

Insert Hollywood Poker disc and type:

```
DIR
RENAME ISA.1 TEMP
```

Now choose a picture file to preview. The files have a three letter name followed by an extension of 1–5 such as 'LOR.5'. Make a note of which one you chose, then type:

```
RENAME LOR.5 ISA.1
```

Reboot, then press fire to see the screen.

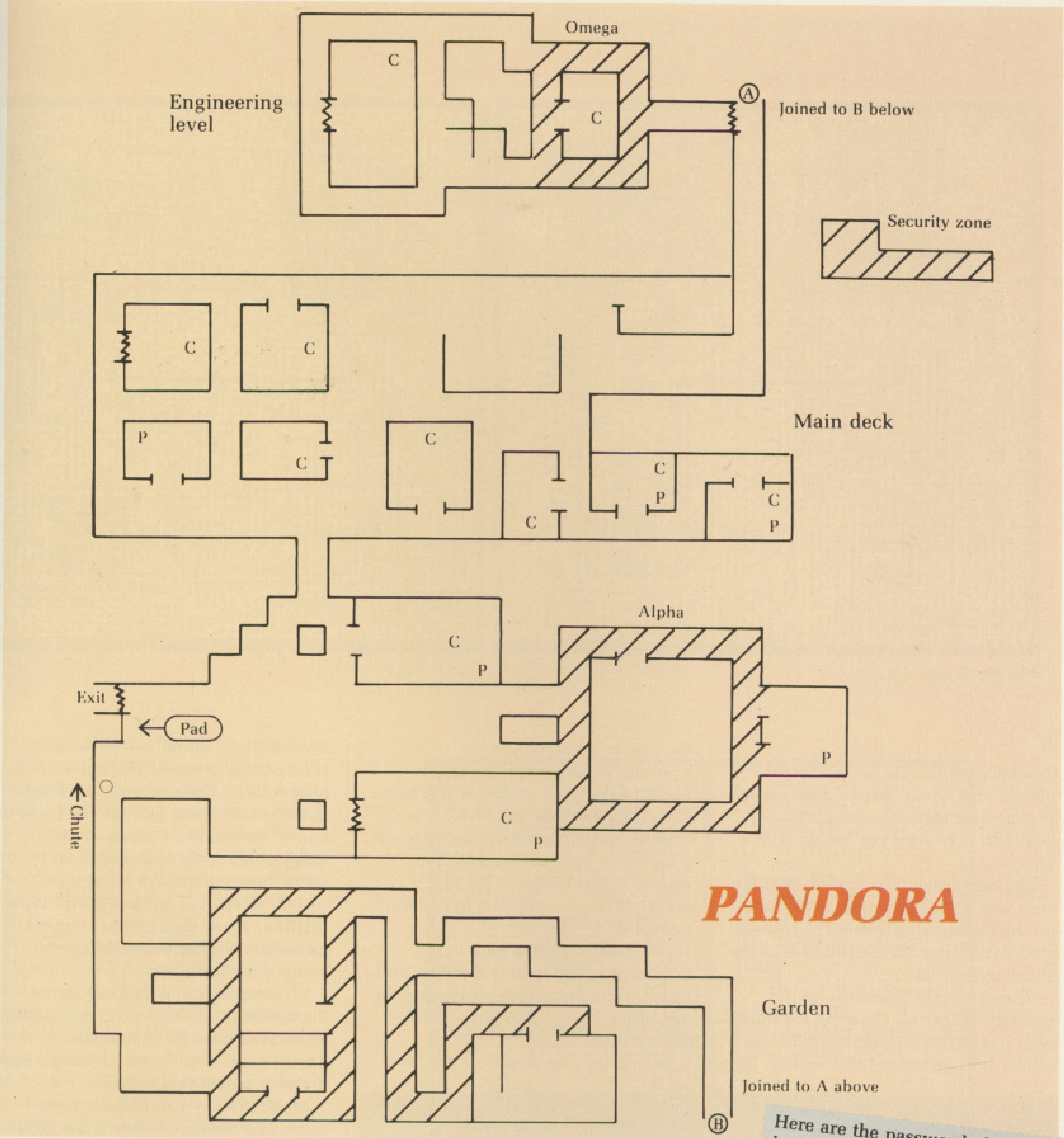
Regular readers, who tune into the Max the Hacks column will know that the joystick master who really knows his Konix, is Adrian Curry. This month he has turned his attention to Pandora.

The mysterious spaceship is nearing Earth, its long lost home. Why has it been away so long? Why have there been no communications with her? Why are you stuck with that certain puzzle? Why don't you read on?

Pandora is a multi-scenario game, so depending on how you play the game dictates the rank which will be given for finishing it. You can, if you like, just go around killing anyone who gets in the way and obtain the rank of Assassin.

On the other hand you could trade with the various characters to obtain the items you need, depositing any relics you find down the chute to you own ship. This will yield the rank of Priceless.

Interaction with the other characters is a very important factor in Pandora. If you help the characters you come



across – rather than killing them – and kill people who are not too popular with the rest of the crew – such as the bank manager – other crew members are more likely to trade objects with you.

If, on the other hand, you do decide to play a more violent character brute force will often be the only solution to gain the items you need.

You will find various weapons as you explore the decks of Pandora. These deal out different amounts of damage, the best of them being the photosabre. Many weapons can be found on security droids, others may just be lying around.

Some, like the electro truncheon, can be used as many times as you like, but others like the laser rifle have only a limited number of shots.

To get on aboard the Generation Ship Pandora it is useful to know who you are likely to meet.

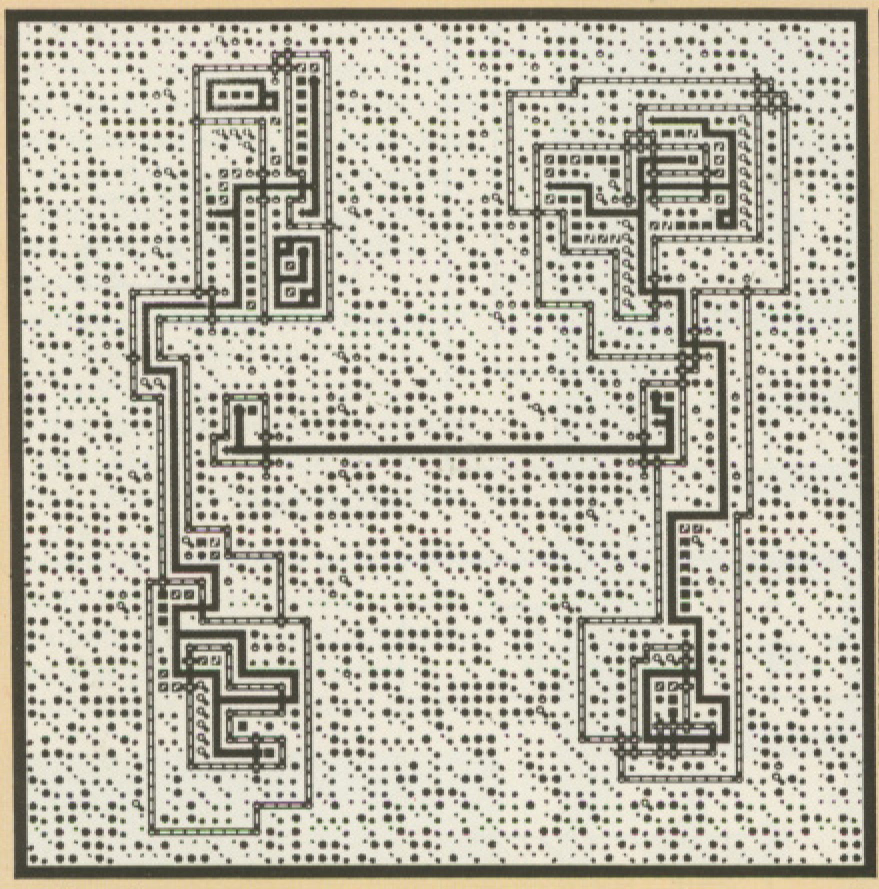
Amy is the girl who gives her life to save yours. There is nothing you can do to save her. The **hooligan** is a yob ▶

Here are the passwords for all the levels of Audiogenic's Impact.

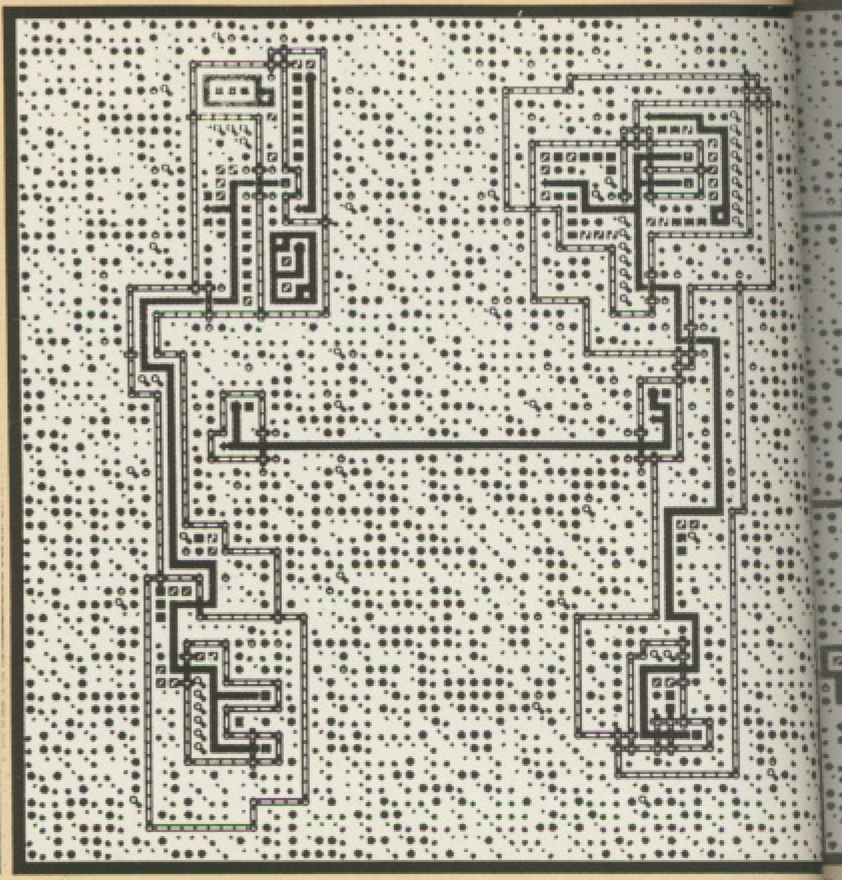
Level	Password
11	Gold
21	Fish
31	Wall
41	Plus
51	Head
61	Fork
71	Road
81	User

Even with these hints Impact is difficult, a great game and so, so addictive.

FIREPOWER MAPS



Modem Player – Map 1



Double Player – Map 1

◀
to watch out for. He is not the first person you would like to meet when you board because he will always beat you if you are not armed with a weapon.

The **engineer** is less hostile. His ID card will get you past the force field on the engineering level; it may also give you some clues to the uses of the sonic screwdriver.

You can make friends with the **security officer** by shooting the **thief** who has stolen a sonic blaster – the officer will give you some insulin for the blaster's safe return.

Be careful the **kleptomaniac** is likely to steal any weapons you have. The **Alien egg** may not be all it is cracked up to be, but is sure to reach a fair price back on Earth. That insulin is just the tonic for the **diabetic**. He also wants a hypodermic to take it.

The **bank manager** may be interested in the money that this trade yields. His destruction will please the rest of the crew – that is until they want a loan.

Search the **rescue officer** for the Delatan Icon which is well worth taking back to earth. The **Science officer** hides three secrets, the dead **chemist** will show you all you need to know. Remember Toupee or not toupee, that is the question – and don't mess with drugs kids.

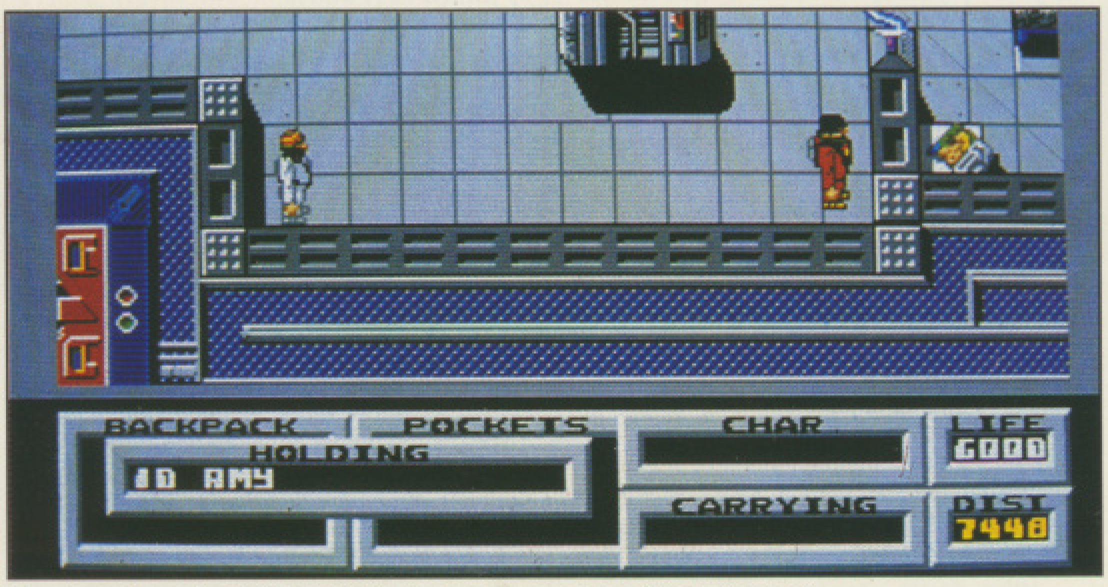
How does your garden grow? With **driffids, death flies** and of course a **gardener** – his favourite phrase is spray it with flowers.

Meanwhile at the medical centre the **medic** thinks that no crime should go unavenged. His companion the **doctor** claims that good old-fashioned violence is the only solution.

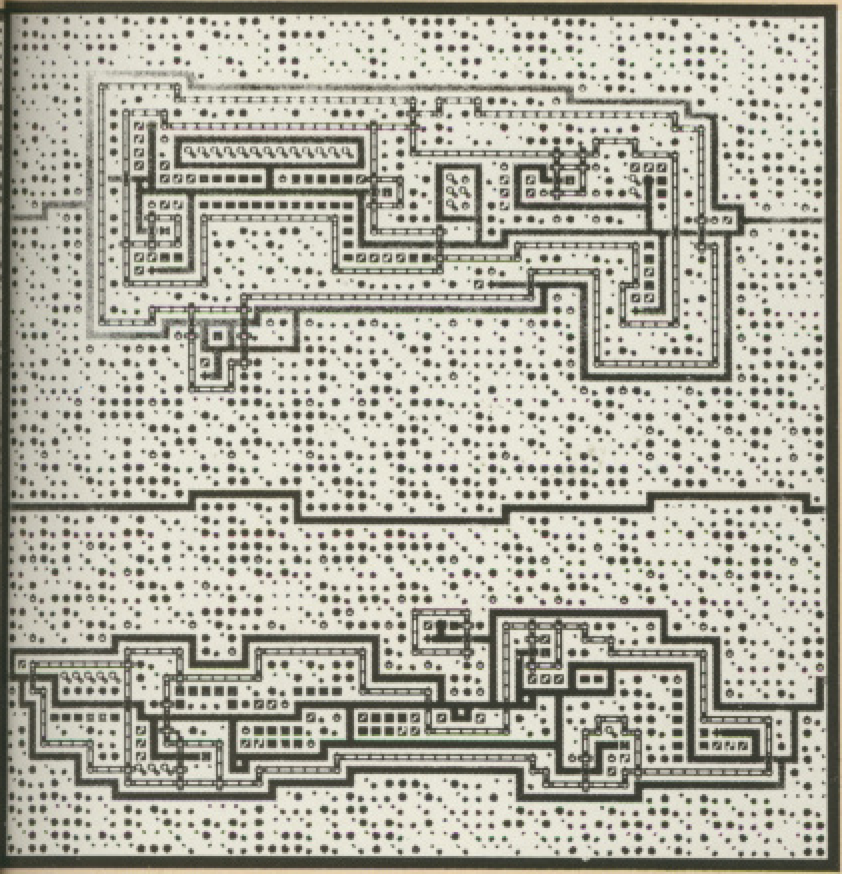
Metal Mickey would have been more like Menial Mickey if his father had been the **menial droid**, a little chap who would help polish up your act. If your act is really good you might put it to music. The **pianist** should just leave it to Sam to play it again. Or the **musician** where a technical solution is the answer to this well read genius' blues.

The smell of fish will lead you to the **wackobrain**, so dodge him and see if the **squash player** can help to boost your moral.

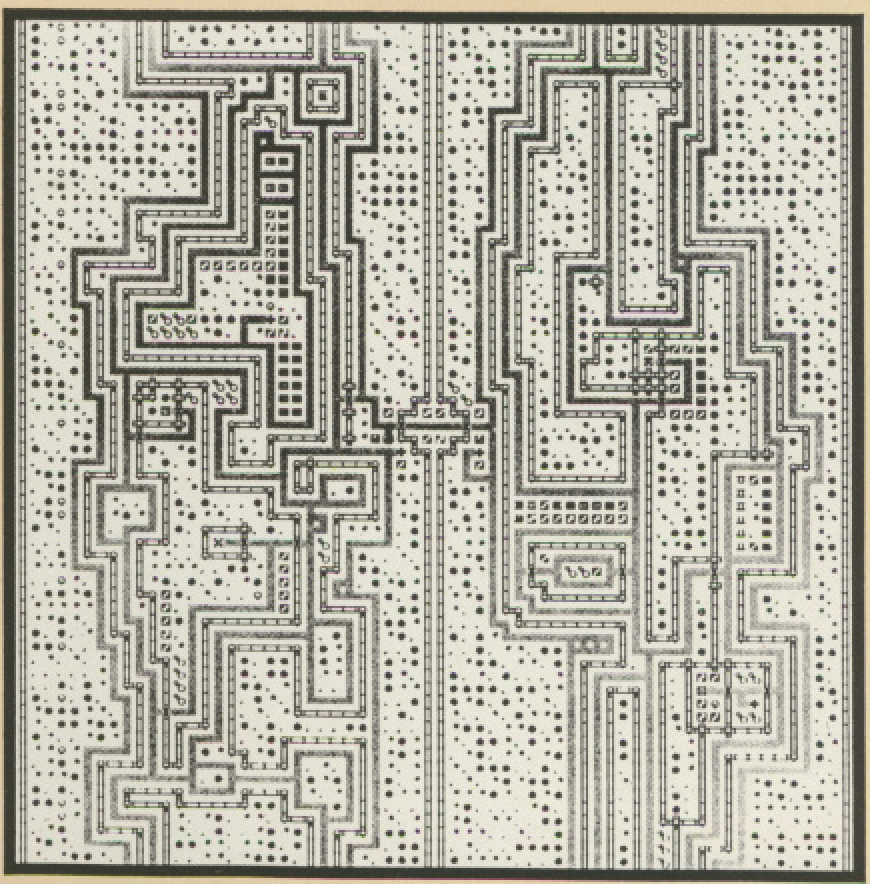
Try to thaw relations with the **ice lord** – ask the computer for some help. He is carrying an item which



Pandora: To get on it's useful to know who you are likely to meet



Double Player – Map 2



Double Player – Map 3

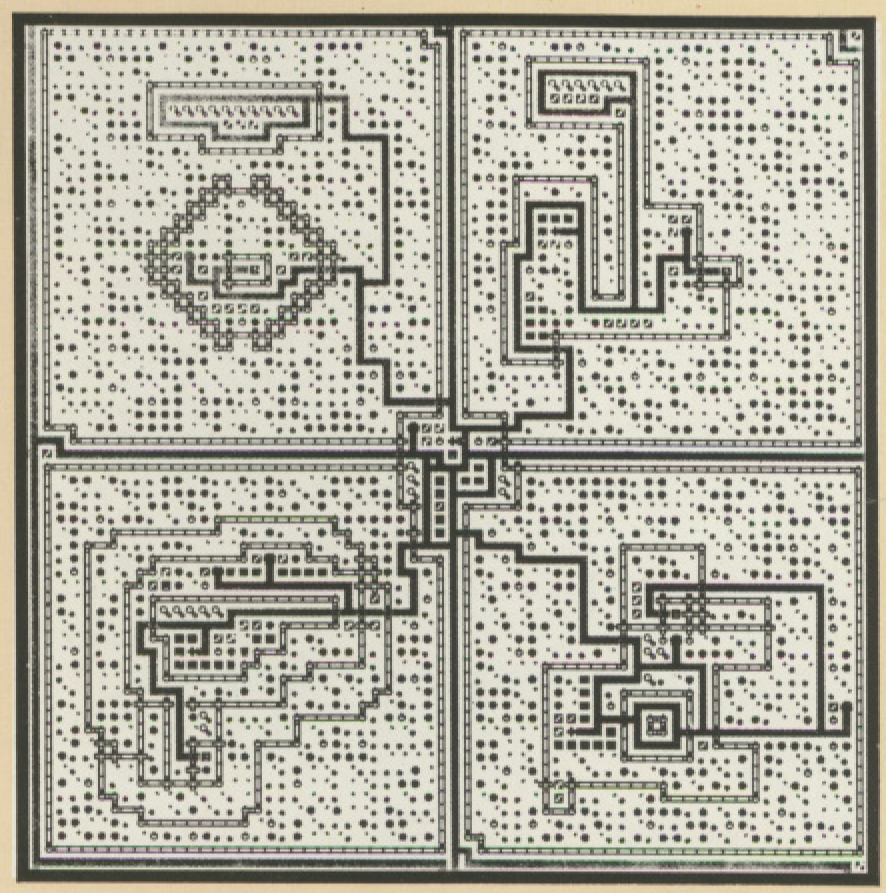
you might find useful in some heated arguments but *don't* depend on the wrong item, valuable as it might be.

Your prayers may well be answered by the **priest**. Pictures are powerful weapons, if placed in the right hands. The **commander** will show you which three codes you need to operate the SDI disc.

You'll need the help of the **captain** to take the self destruct initiation disc along with the codes to the main computer, located on the engineering deck. While the **AWOL officer** has the right IDea, you should do the same ASAP. To get the last code the **robo mechanic** will help if you drive the point home and fix the problem.

Look out for some special alien artifacts such as the Ostron egg, the Vulcan vase and the Mobian brain. This last item has the beneficial effect. When taken unto your hands it will regenerate your life force.

Max the Hacks is always on the look-out for help in game playing, send you hints to him at 78-84 Ongar Road, Brentwood, Essex, CM15 9BG. A game from the goodie drawer and a Konix Speedking joystick for all he prints.

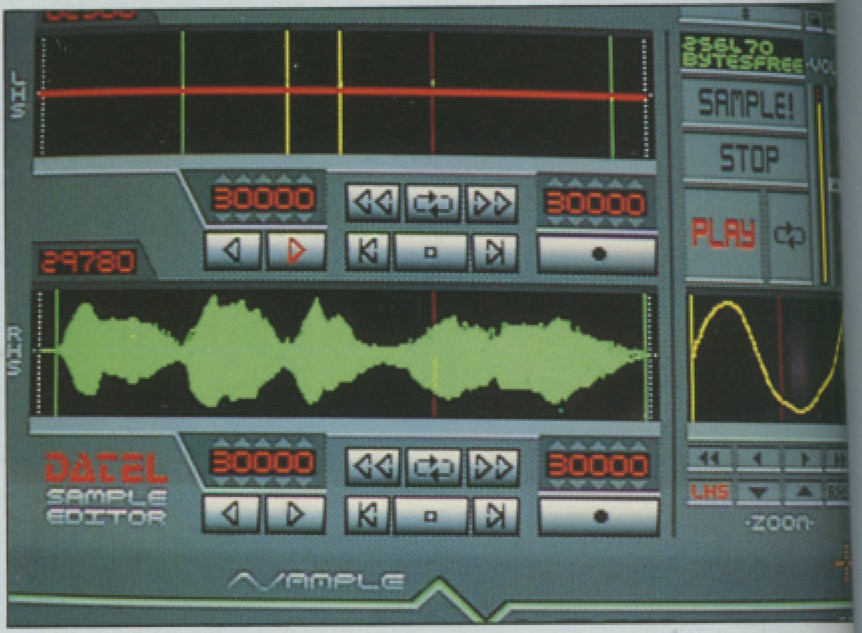


Single Player – Map 2

Map 1 was published in the July issue of *Amiga Computing*.

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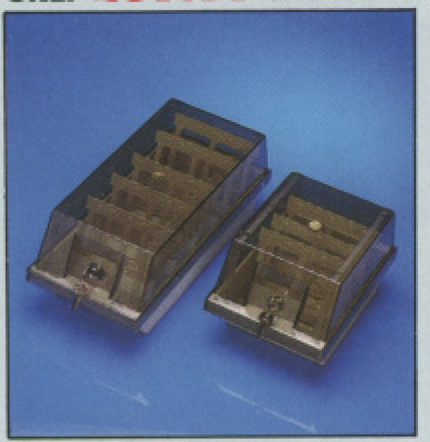
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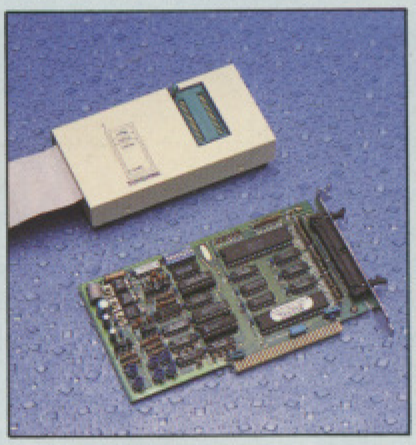
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Into the silicon underworld

Rupert Goodwins dons the cans and plays Pluto to Paula's Eurydice

MUSIC might be the food of love, but good sound effects are the Big Macs of synthesised warfare. The Amiga has the best sound of any home computer doing the rounds. It speaks. It sings. It can reproduce the last gurgle of alien blood boiling away into the vacuum of interstellar space as accurately as lesser computers imitate an electronic watch going beep on the hour. And it can do all this because of a little sliver of silicon called Paula.

Paula (Peripheral AUdio Logic Array), together with a few supporting chips, is the Amiga's sound system. It's more than that. The designers took the opportunity to sneak in some control signals for the floppy disc interface, as well as some of the RS232 interface. And why they did this shows a lot of the thinking behind modern digital design.

It might seem odd, this lumping together of different functions in one chip, but there is – as always – method in a digital design engineer's madness. All of the things Paula does are peripheral activities; the computer might want to make a noise, read some data from a floppy or a modem, but most of the time it won't. So it has to be able to select which peripheral it wants to use, and send it data or control signals independently of the others.

A lot of computer design is concerned with synchronising peripherals like this, and a lot of the circuitry – also called logic – in a reasonably complex computer like Amy is devoted to this end. And much of it is replicated – for example most peripherals provide or need data, so, as those of you who were paying attention last month will know, the data bus connects them all to the central processor and the memory circuits.

But as the data bus is the only way to transfer the data for anything, it can only hold one particular set of information for a short time before being needed for something else. Since most peripherals need to hold data for quite a long time, they need to have some way of remembering the information while they use it, and long after the data bus has changed.

Looking at Paula's innards on page A-22 of the Amiga 500 handbook – A-20 for the 2000 – you'll see that the data bus is connected to a set of data registers. These are specialised memory circuits which store small amounts of information and let the rest of the chip act on it.

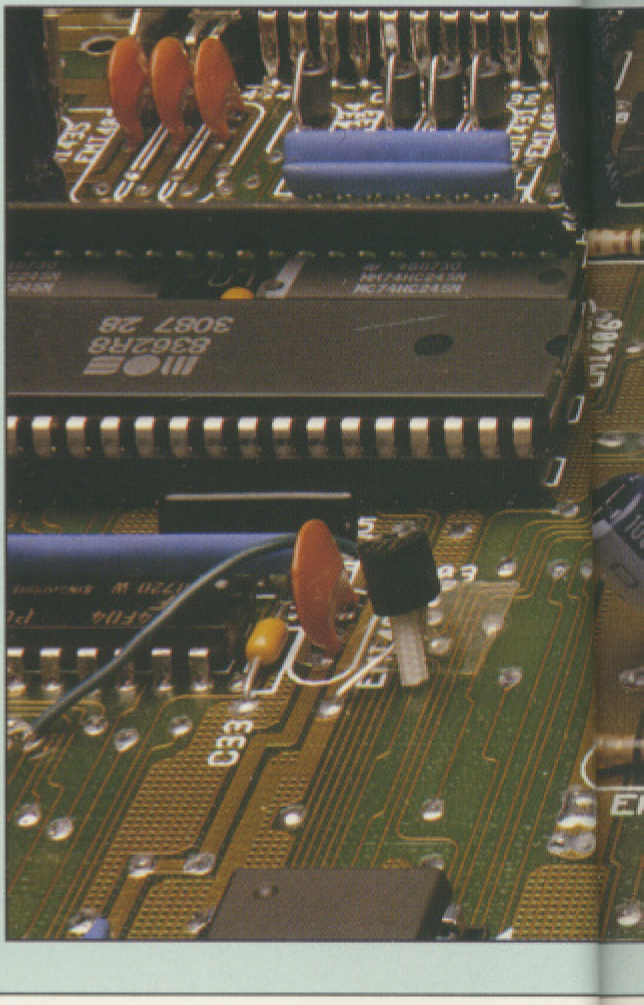
Although each separate block of circuitry – audio, disc, UART, pot – within Paula has its own registers, they all link on to this internal data bus and share a common buffer.

A buffer is a form of amplifier, which takes the signals from the chip and beefs them up before they hit the outside world. They have a chance of surviving the long wires on the printed circuit board, the pulses of interference and electronic noise that infest a computer circuit. The buffer also cleans up signals that come in from the cold before passing them on to the rest of the silicon.

As all the circuits inside Paula share the buffer, only one set of pins is needed on the chip to connect to the data bus outside. Pins are a perennial problem for the engineers who build chips; even the biggest physical package can only have about 100 pins on it.

The bigger the package, the more expensive it is to produce, so the tendency is towards smaller packages with fewer pins. But the more complex a circuit, the more signals it needs to communicate with the outside world, so the more pins it needs. Anything that reduces the pin count, therefore, is regarded with relief.

You could, of course, split



everything into separate packages. But this costs a lot, and makes the circuit board difficult to design. So lots of different functions get stuffed into one chip. Like Paula.

Control is what it's all about. As well as the common data bus buffer, Paula's disparate bits share register address, DMA and interrupt logic. Register address is the stuff that selects which bit gets the data bus when. It comes from Fat Agnus; it works like the main address bus which determines which bit of memory connects to the databus at what time. Fat Agnus is the memory controller – amongst others – and it sometimes needs to be able to tell Paula and Denise, the video chip, who some data is intended for.

That's where DMA, Direct Memory Access, comes in. In earlier computer systems – some more recent ones, too – the only thing that could get at the ram was the central processor. It, and it alone, could transfer data from the peripherals to memory and out again.

This meant that performance was limited and that the processor spent most of its time doing nothing cleverer than imitating several pieces of wire. By letting the peripherals read and write directly to memory (DMA...all make sense, really), the theory goes, the processor can spend more time working out sums and the speed of information ladled out to screens, speakers and discs increased.

However, when there are lots of peripherals with DMA capabilities, there needs to be some clever circuitry to decide who gets precedence. At the bottom of it all, there's only one set of ram chips and only one device can get at them at once.

What happens when Paula decides that it's time for some sound data, Denise wants to read some sprite data and the 68000 – probably miffed at not having a name – demands another instruction, all at the same time?

If they all put the address of their data on to the address bus simultaneously the only output will be olfactory as the delicate fragrance of fried package competes with that of cold pizza in the design lab. A distinctive mix, known as Crie du Despair in the trade.

Fat Agnus considers all the requests – Paula's comes from the DMA request logic in the top left hand corner of the block diagram – and provides data for one lucky chip. While Paula or Denise are receiving data, the processor can't get at the memory, as the control signal which says "OK, come and get your data" is kept waiting, so in practice some of the advantages of DMA are lost.

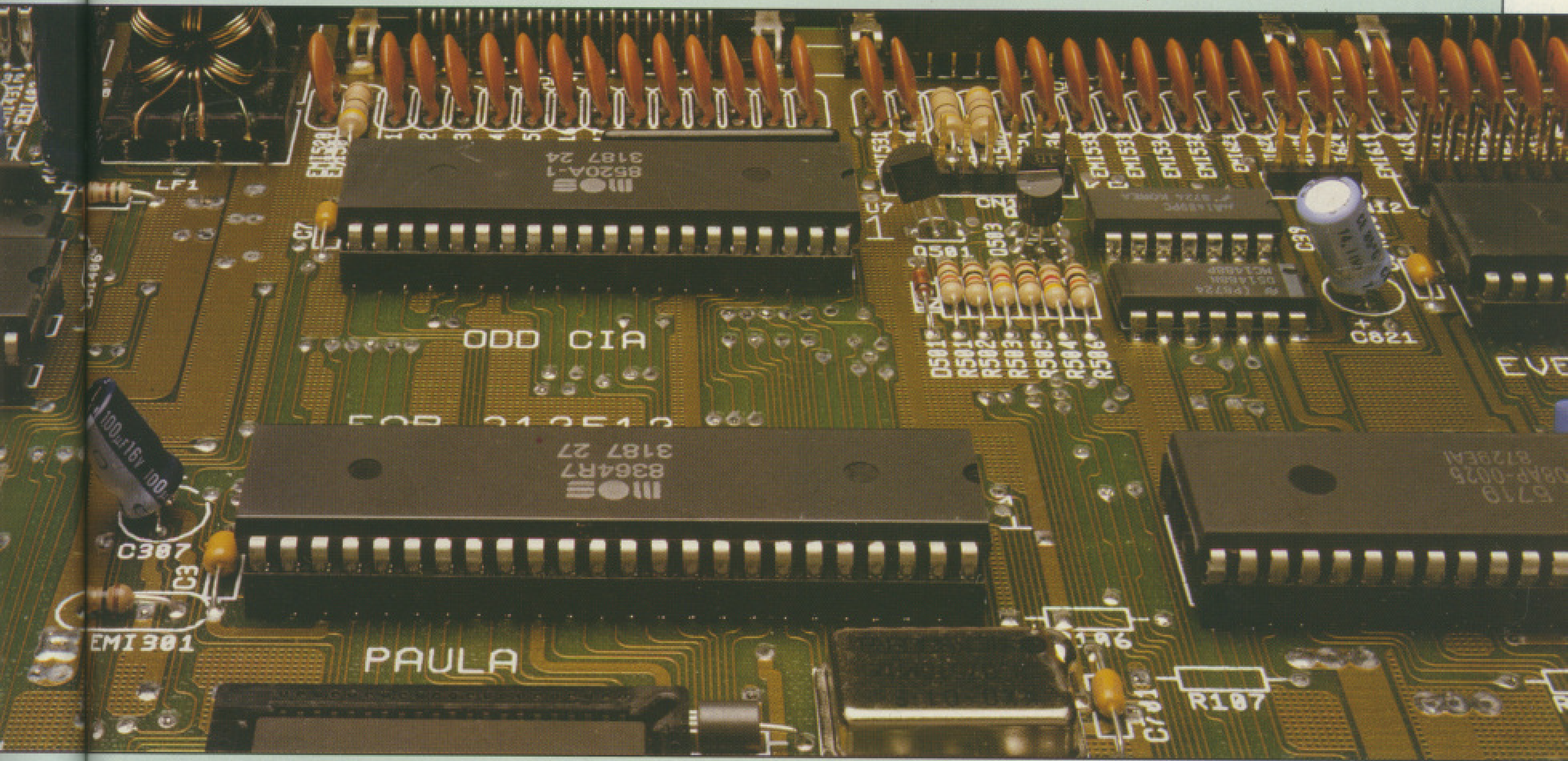
However, by clever design the 512k of expansion memory can be accessed by the 68000 while the rest of the gang are troughing away at the lower chip or display memory, so programs run faster and owners are smugger.

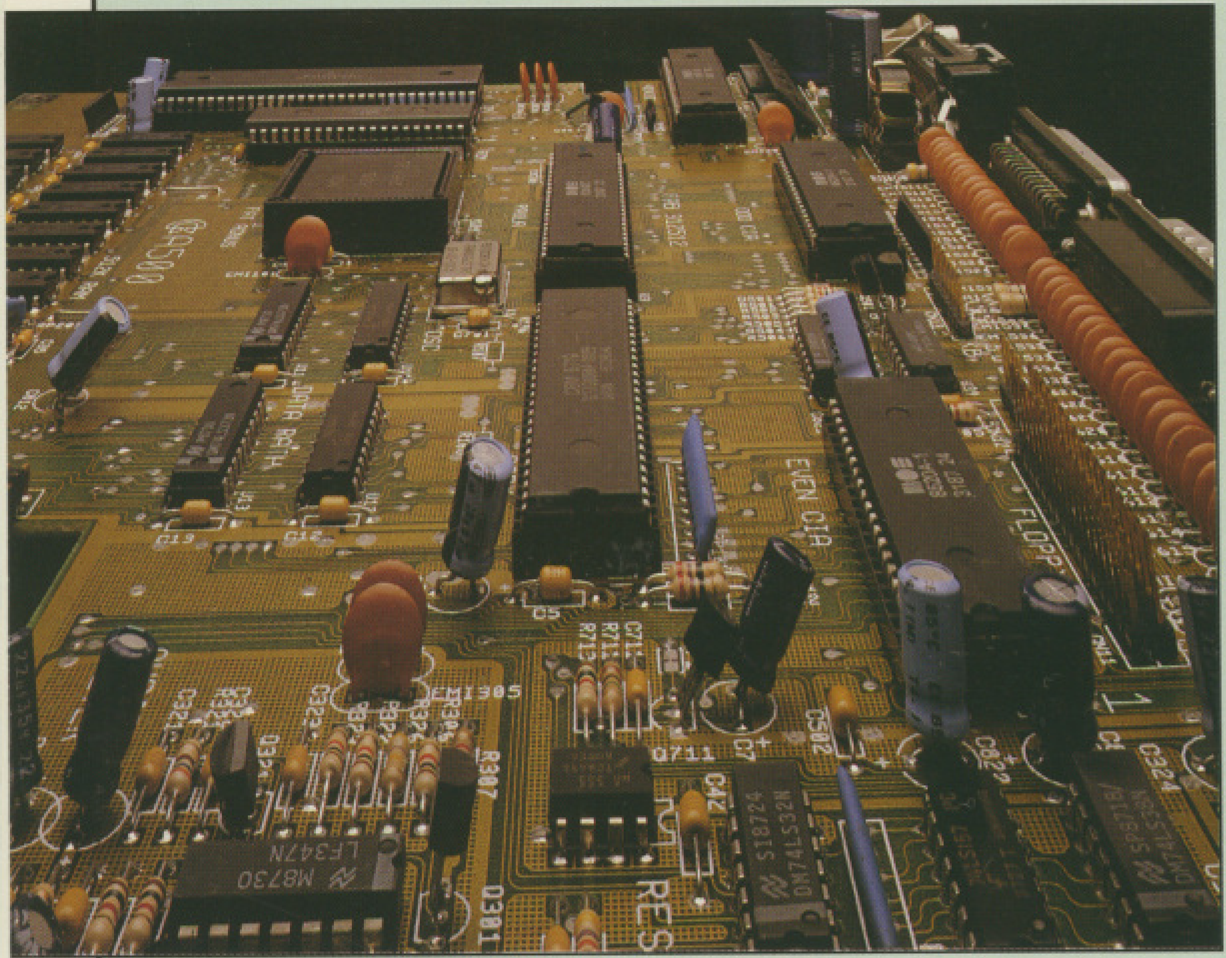
Also, the display memory can accept or produce information twice as fast as the processor requests it, which means the custom chips can often slip in a quick transfer behind the 68000's back. And it's not always possible to interleave everything, which is why sound sometimes gets held up while the disc drive is being used. Such intrigue; worthy of Dallas at its steamiest.

The last common block in Paula is the tersely named Int Control Logic and its associated registers. Interrupts are signals which tell the processor to stop what it's doing and attend to an urgent request.

For example, the UART section in Paula is often hooked up to a modem, and the REC block collects the incoming stream of bits in a buffer. After nine or ten bits, the UART has a

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complete byte of information, and the next byte starts coming in immediately. So the UART raises an interrupt, which the 68000 gets. This tells it that it has to retrieve the new byte from Paula and do something with it, so that the receive data buffer can be cleared ready for the next time.

Of course, the 68000 could spend all its time checking the buffer, but then it wouldn't be able to do anything else. As the audio circuitry, the disc interface and other bits can all generate interrupts, Paula also gives each type an individual interrupt number. This lets the 68000 know who needs attention, and react accordingly.

Remember the sound? Now Paula has the data, the control signals and the connections, it can make whoopie. Sound is a series of changing air pressure levels, like the weather but about a hundred million times faster.

A loudspeaker has a cone or sheet of material, and uses an electromagnet to convert a voltage to the position of that material. If the voltage changes fast enough, the movement of the cone produces waves of air pressure changes that we perceive as sound. So all the computer has to do is produce a changing voltage that matches sound waves, and we have liftoff.

The Amiga, and all digital computers, are happiest when dealing with numbers in binary form. And those are what Paula will get from the data bus – a set of voltages which will either be 5 volts or zero. It's surprisingly easy to turn these into a single, fully variable voltage.

Remember resistors? These are electronic components which, among other functions, reduce voltages. If you take two resistors of the same size, connect them together in a series configuration and put the whole lot across a voltage then the point between the two resistors will end up at half the main voltage. This is called a potential divider, as the two resistors divide the voltage between them.

If you make the top one bigger, then the voltage in the middle drops, and if you make the bottom one bigger the reverse happens. So by judicious choice of resistor values, you can make a potential divider which, given 5 volts at the top, produces any voltage below 5 volts, naturally, at the junction of the two voltages.

Now imagine you want to produce an audio signal with a peak value of 1 volt. No, I don't know why you'd want to either, but imagine, just for me. Thank you. Now imagine that you've got 16 bits of data which, if all ones, will represent one volt and, if all zeros, represent zilcho.

Take the first bit. Connect it to a potential divider which produces one tenth of the input voltage, and you'll get 0.5 volts if the bit is at a one (5 volts), and nowt if the bit is zero (0 volts). Connect the second bit to a potential divider that produces one twentieth of the input voltage – 0.25 volts and 0 volts. Third bit goes to a one fourtieth divider – 0.125v and 0, and so on.

If you add all the voltages up for all bits being one, you'll get one volt. And as the number represented by the 16 bits is decremented (compuspeak for "has one subtracted from it"), the sum of all the voltages from the 16 potential dividers falls towards zero. So, add up all the voltages and you can have any voltage you like. That's an analogue voltage; analogue means smoothly changeable. In an analogue watch the hands don't skip from 3 to 4, they smoothly sweep out the space between.

That's the principle of operation of a digital-to-analogue converter. Look at page A-22 (A-20 if you have a 2000) again. Two boxes, marked D to A Conv, are connected to Left and Right Audio Output. Each box contains two digital-to-analogue converters, and together make up the four channels of audio the Amiga boasts.

But if the processor had to provide every value for all four channels at the rates that music demands – over twenty thousand times a second – it wouldn't have much time to check for keypresses, work out what to do next, or any of the tasks that a good game or utility demands.

Repetition is the name of the game with audio signals. Most musical noises are a single waveshape repeated hundreds or thousands times a second. This rate of repetition gives the note – thousands of times a second is a high frequency, and hundreds a low one.

Different sounds have different shapes; a flute's waveshape is a sine wave (as seen in a thousand science-fiction films on the screens of the decomfibulatory machine), an oboe tends towards a triangle shape. and violins and pianos have a complex waveshape which defies description

but bears repetition. And the Amiga, with its sophisticated DMA and interrupt structure, helps to do this.

Write a set of numbers into the display ram which correspond to the amplitude of the waveshape at a particular time – starting out as zero, rising to a maximum in a straight line and dropping back to zero again, in the case of an oboe-ish note.

Then tell Paula and Fat Agnus (look at page A-17 – Fat Agnus has some audio control registers too) where the wave starts, where it finishes and how many times a second it is to be repeated. Voila. A note will play, and the processor can go away and worry about intergalactic megadeath again.

Every time Paula has to read some more data from memory to continue the note it can make a DMA request, and Fat Agnus can grant access. When the time comes to start the wave again, the circuitry recalls the beginning of the area of ram with the data in it and carries on.

Of course, music has a lot more than basic repetition going for it (scratch devotees take note). But most of the frilly bits – the dynamics as music gets louder and softer, the changes in the sound of the note as the note goes on – take place over appreciable fractions of a second. The processor can load in new bits of wavetable as it likes, because the difficult business of shovelling out the information is automated it's got loads of time to work out the niceties.

OUTSIDE Paula, there's not much to worry about. Page F-5 shows the attendant circuitry that lives between the audio output lines and the chip itself. The triangles, U14 to a man, are amplifiers in a chip. The resistors and capacitors that surround them form a rather simple form of tone control.

It's much like the gubbins that hang off your graphic equaliser, except that the controls are fixed. Mostly, it gets rid of high frequencies, because the process of generating sounds by rapidly changing digital values can also generate some unwanted and unsightly side noises. These are, by and large, much higher in frequency than the desired notes, and can easily be disposed of by the sort of simple circuits on page F-5.

Inside Paula there remain the two blocks called disc and pot. Disc can safely be left for another day. And pot? True, these Californians are amazingly laid back, but in fact pot is short for potentiometer, a form of potential divider with a knob on so that the ratio of the two resistors can be changed at will by the user. Analogue joysticks use these, and the pot circuitry detects the changes in the voltage and turns them into digital numbers that the computer can read.

And that's (most of) Paula. All this, just to say Game Over and play a little tune while you type in your high score. Wait until you see how they do the video . . .

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TO ORDER PLEASE USE THE FORM ON PAGE 65

REAL Programmers (RPs) do not use Pascal – it is too easy for mere users to comprehend. A Real Programmer produces code that cannot be understood by users, and preferably cannot be understood by other Real Programmers, or even the same Real Programmer at a later date. To this end, techniques such as block structure, variable names longer than one character, comments and local variables are useless.

Real Programs should not be indented, and indeed should not have a structure that could ever be indented. Loops, if such are ever used, should be either five to a line, or span at least five pages. Concepts like types are only used to impart confusion, as all a Real Programmer cares about is the bits.

Those of us who are not keen to enter the ranks of Real Programmers could do well to use Metacomco's Pascal for the Amiga. This is now in its second version, having had bugs removed and functionality added.

The compiler is provided on one disc, along with the linker, files for interfacing to the Amiga systems software and comprehensive examples. An added bonus, not documented in the manual, is the inclusion of the "make" utility from the Metacomco Toolkit. This tool is not specific to Pascal or the Amiga, but originated on the Unix operating system as a general aid to compiling large programs of several modules.

It could be the subject of many words, but I will limit myself to saying that it is a welcome sight, reducing the mental energy involved in keeping track of what needs recompiling in a large project. The compiler will quite happily run on a 512k double drive system, and with a little perseverance could be used on a single drive system.

At this point it should be mentioned that this compiler is not an integrated environment. It comprises a program that takes Pascal source code in one end, and passes object code out the other. The source must be created using your favourite text editor, such as that on the Workbench. The compiler is not aware of the Workbench environment, the CLI must be used to drive it. Whether this is a good approach or not is a religious issue – given a number of programmers, there will be the same number or more opinions on the subject.

I prefer this approach as I am happy with the editor I use and do my work from the CLI anyway, but others have different views.

The 300 odd page manual is impressive. Not only does it explicitly document the details of Metacomco's implementation of Pascal, but it gives a good description of the language in general.

It would be possible, given a knowledge of other programming languages, to learn Pascal from this manual. It has sensible examples of the individual points, as well as some more heavweight examples of complete programs that make use of the Amiga's features. Other sections cover the internal workings of the compiled code such that C or assembler could be combined with

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Real Programmers turn the page

Sam Littlewood compiles his opinions on Metacomco Pascal Version 2

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Pascal and the differences from Borland's Turbo Pascal.

Metacomco Pascal conforms to the ISO Standard 7185 – Specification for Computer Language Pascal, with extensions. The adherence has been validated, so code from other validated systems should be relatively easy to import. Any problems are going to come in the area of extensions to the language.

Just about every Pascal compiler provides extensions to make life easier for programmers. Those provided by Metacomco are good, bringing the system up to scratch as a serious development language. They must be explicitly turned on when compiling, otherwise the compiler will only accept standard Pascal. In a similar vein, extensions are noted as such in the manual.

The lack of variable-sized strings has always been a much criticised mis-feature of Pascal. Metacomco Pascal has been extended with a new basic type for dynamic strings – 'STRING'. To supplement this, an appropriate set of string manipulation functions are included akin to those provided in Basic.

An excellent set of extensions are provided for using multiple source files. The first of these is the 'INCLUDE' statement, other files can be included in the source as it is compiled. This allows constants and record definitions to be moved out into separate files, possibly for sharing by several source modules.

To call functions and procedures between modules there is an import and export mechanism, allowing one module to export a procedure and another to import it for use. This separation of a program into several files not only allows better management of the code, but means that only the files that have been changed need be recompiled – the linking of the separate objects into one is done separately.

These features are exploited by the example programs and by the set of 'include' files that define the interface to the Amiga systems routines. In these files, the names of constants, records, and record members are the same as those used in the C include files provided by Commodore. This allows sensible use of the existing Amiga documentation and books, as well as easing conversion of language code.

A common extension of Pascal compilers is in the area of file-handling. Metacomco has addressed this area; a useful set of routines exist for manipulating named files, possibly in a random access manner.

Another common area of expansion is to use 'compiler directives'. These are special commands that tell the compiler what to do. This gives control of where the compiler will put error checking in your program, allowing working code to be speeded up, while still keeping suspect sections under scrutiny.

Metacomco Pascal provides conditional compilation. This allows sections of code to be included or excluded from compilation. A common use of this is to allow debugging statements to be applied as necessary without editing them out.

One of the features of Pascal is that it includes code in the compiled output to perform error checking. This can be in areas such as bad array subscripts, misuse of pointers and I/O.

Other useful extensions include: The 'OTHERWISE' keyword for use in CASE statements, specification of integer constants in binary, octal, decimal or hexadecimal and bit twiddling operators similar to those in C vital for using the Amiga's in-built routines.

There is a comprehensive set of maths functions, the ability to use either single or double precision IEEE floating point, a miscellaneous collection of routines for interfacing to the system and other languages for finding the memory address of an object, or its size and so on.

The compiler was excellent in use. It produces a good range of meaningful errors, accompanied by the offending line. It will stop at each error, the compilation can then be continued or aborted. This pausing can be disabled if you want. I had no unexpected problems bringing up code from another Pascal system.

It was surprisingly fast – compilations tended to be limited by the speed of the disc rather than the compiler. However, the linker supplied, ALink, is not as spry. It would be advisable to obtain the shareware linker BLink as this is much faster.

The size of the code produced by the compiler is not stunning, although this seems to be a combination of the error checking, which can be turned off, and Pascal's inability to pre-inititalise variables.

In conclusion, Metacomco Pascal is a well documented, serious development tool. It provides access to the features of the Amiga in a way that is consistent with existing documentation and programs.

If you are experienced in Pascal or Amiga programming, you will have no problems with it. However, as it is purely a Pascal compiler, nothing more, those of you starting from scratch will need documentation for the Amiga, and other tools to support your programming. A Real Programmer would not buy this product, as it makes programming too easy. He or she would tend to view compilers and assemblers – with the possible exception of Fortran – as crutches for those too weak to write machine code in hex.

REPORT CARD

Pascal Version 2
Metacomco 0272 428781
£89.95

USEFULNESS
A great Pascal, but the Amiga is seen as a C engine and Pascal as antiquated.

EASE OF USE
Programmer friendly interface, good error message handling, comprehensive documentation, generally good.

INTUITION
Runs from CLI not Workbench but obeys the rules and is as Amigarised as you would expect from the people who wrote AmigaDos.

SPEED
Impressively swift, only time for instant coffee while waiting for a compile. The resultant code is no slouch.

VALUE
A professional piece of programming at a sub-professional price, but still a bit steep on the hobby user's plastic.

OVERALL 82%

The best Pascal available for the Amiga. However the industry's move to C devalues this accolade.

AMIGA Letters

RTFM?

CONGRATULATIONS on the magazine, which I find enjoyable, informative and much the best of the British Amiga mags. I do, however, have one complaint concerning Amiga Answers, your problem page. In the July edition this section contained four queries, the answers to two of which can be found in the manuals supplied with the equipment.

The memory expansion question is answered on page 1 of Introduction to the 501 which comes with the expansion, and the question about dragging multiple icons is answered on page 4-34 of Introduction to the Amiga 500, also supplied with the machine.

Given the amount of space – far too little – allocated to this important section of your magazine I feel that it should be devoted to the solution of genuine problems and not to giving a free ride to people who can't be bothered to read manuals properly.

P. Kenton,
Liverpool.

General Assembly

I HAVE recently bought an Amiga 500. Could you tell me which is the best commercial assembler available at the present time?

S. Winstanley,
Colchester.

For a fully featured assembler you should look at the Metacomco (0272-42871) offering. This tends to be favoured by programmers who are used to mini and mainframe computers. Devpac from Hisoft (0525-718181) runs very much faster, but has fewer enhancements. The cheapest offering is K-Seka from Kuma (07357-4335). – Ed.

Upgrade problems

I AM upgrading to an Amiga from an Amstrad PCW so I know very little about the Amiga and the software available for it. I will be wanting to purchase software for graphics and sound editing but I am unsure as to which packages are most suitable.

As I am a hobbyist, I only want to pay about £60 for each package but also expect good quality output from them. The graphics package needs to be suitable for cartoon style frame work.

J. Graham,
Norfolk.

Ideally you should look at the manuals for any product you are considering. Although I can't recommend any dealers in Norfolk readers in London would be well advised to visit Pilot Software City.

Your sound problems could be solved with Studio Magic, which costs £65 and is available from The Amiga Centre Scotland (031-557 4242). Your price limit rules out the Electronic Arts Deluxe series, so take a look at The Director, which is sold in the UK by HB Marketing (0895 444433).

Expansion possibilities

I OWN an Amiga A500 with modulator and two external drives, and a few things I have read are giving me cause for concern. One of the reasons I bought the Amiga was because I was told that with the PC Bridgeboard – or is it Sidecar? – you can get 100 per cent compatibility with an IBM. Reading your magazine I get the impression that 100 per cent compatibility can only be achieved on the A2000. Is this true?

I know you can get a PC transformer for the A500, but it doesn't offer full compatibility. Is there a bridgeboard for the A500? Is the Pacific Peripherals Sub-system 500 a bridgeboard for the A500?

Reading July's Amiga Answers I got the impression that the A500 is not easily expandable past 1Mb. Is this true? Are the two new Amigas aimed at the business market and will they be compatible with all existing Amiga software? What is a genlock?

Instead of a monitor I use a 14in CTV which causes unbearable flicker in interlace mode. Is there an anti-flicker screen for such situations? Can the new processor (68030) and maths coprocessor (68882) be fitted to my A500?

Which 20Mb hard drive would best suit my computer?

W. Andrew,
Oldham.

Let's take your problems step by step. If you have two external drives we hope that you are using a second power supply for the third drive (DF2:) as the A500 power supply can't cope with three.

Sidecar is the PC add-on for the Amiga 1000, Bridgeboard offers the same thing for the Amiga 2000. It might be possible to rig up a Sidecar for a 500, but Commodore advises that attaching the two would make Sidecar unreliable. Most of your questions about the Pacific Peripherals Sub-system are answered in our review. It is not a bridgeboard, just an expansion cage. It does not have PC slots, so there is nowhere for the bridge to go to.

Expanding an A500 to 1Mb is easy – just fit the A501 expansion pack. Beyond that you either need something like the Sub-system or the Spirit Inboard. The Inboard slots into the same hole as the A501 but contains up to 2Mb.

Unfortunately, due to the world Dram (memory chip) shortage, these have become very difficult to get and are very expensive. If you can find one

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Write to: The Editor, Amiga Computing, 78-84 Ongar Road, Brentwood, Essex, CM15 9BG. We'll send the writer of the best letter each month a program from our goodie drawer.

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expect to pay around £1,000 for it.

The A2500 machines are A2000s with special expansion cards fitted. While they will be very expensive – don't expect too much change from £10,000 for the 100Mb Unix system – they will be A2000s under the gloss. Switch on an A2500UX with the left mouse button held down and it will run Interceptor as easily as your 500.

Video equipment is very fussy about when it should receive its signals. Send an image at the wrong time and everything goes haywire. A genlock is an interface between the video output of a computer and the video input of a recorder, mixing desk, Quantel Harry whatever other digital effects generator you happen to own. It sorts out the timing and makes sure the signals are there when the video wants them..

The flicker is caused by the Amiga sending more information than can be displayed on a normal screen. To eliminate it you need a monitor with a higher scan rate. Then your computer needs to send the signals in a form that the high scan rate monitor can use.

The Microway FlickerFixer only *works in a B2000; there are no video slots in the Sub-system. Commodore's Enhanced Chip Set (ECS) will offer non-interlaced high resolution modes, but no release date has been set – our guess is early summer 1989 – and will still require £400 worth of monitor. A here and now option would be a long persistance monitor which would smear when anything moved.*

There are companies which build mini-computers based on a 68020 so unless you have some huge number crunching tasks to do – astrophysics, ray tracing, that kind of thing – putting a 68030 in an A500 is a bit like fitting a jet engine to a C5.

The Supra hard drive from Precision Distribution (01-336 7166) is the neatest hard disc.

Sound sampler

I AM a young Amiga 500 owner and I'm writing for various reasons. Which is the best value sampler around? Would you recommend a head-cleaning disc, as I have heard that they can damage the heads, and if you would, how much and where from?

Peter White, Sheffield.

Our survey in the July issue of Amiga Computing *found the Eidersoft (0708 856468) Pro-Sound sampler to offer the best value for money. Rumour has it that Y2 Computers (0923 50161) is planning a cheaper, mono, rival. If you brushed your teeth every half hour you would damage them. Disc drive heads also need cleaning, but overdoing it can damage them. Once every 18 months should be about right.*

Game creator

PLEASE could you tell me what I need to be able to program games on the Amiga 500. I wish to be able to program games which are like bought ones in terms of quality. Will I only need a language such as C or will I need an assembler or compiler language as well?

Reuben Wilkinson, Herts.

First you need to learn to program. AmigaBasic is a good place to start because you have a free copy with your machine. Top notch games are written in assembler, but C is a good stepping stone. For a quick solution to your problem look out for Shoot-em-up Construction Kit – Ed.

Amiga Answers

Infected

Q *Now that the Amiga A500 has dropped so sharply in price, it is quite likely that I will upgrade from my humble Commodore 64. However, the one thing that worries me is the virus. Also, with the arrival of the Byte Bandit it seems that it is becoming harder to track down these annoying programs.*

How do you use the disc sector editor to find the virus and how do you recognise it? Once you have found it, how do you get rid of it? What editors are on the market, which one would you recommend and how much is it?

B Moffat, Fife.

A If you look at track 0 sectors 0, 1 and 2 you should find the boot sector. Unfortunately the way the Amiga creates the boot sector means that while only the first few bytes are used, the rest is junk from memory. You would need to disassemble the code to find out what it does.

Getting rid of a virus is easy, just pop into CLI, and INSTALL the disc. Sectorama is a public domain sector editor. You will be able to get a copy from ICPUG, the Amiga User Group, George Thompson Associates or your fave source of PD software. While you are at it get a copy of VirusX, the PD virus killer.

Bright Star

Q *I have just purchased a Star LC-10 printer, an amazing piece of hardware, and it definitely shines brighter than the competition in the price range. However I have a problem with some of the printer escape codes.*

While going through the LC-10's printing features the Star manual gives the escape codes for expanded, double height and quad-sized characters for example, but there is no equivalent escape codes within the Amiga preferences. I use Scribble! for word processing and find the same problem.

I have tried embedding the Star escape codes and sending the file direct to the parallel port to bypass the Preferences but all I get is part of the escape code printed in the text.

Please could you tell me if there is any way that I could get the printer to carry out all of its features while using it with an Amiga 500? I was told that the Star LC-10 is compatible with the Amiga, but, is the Amiga compatible with the Star LC-10?

Steve Walker, Eastbourne.

Solve your Amiga anxiety with a letter to Amiga Answers. Our panel of experts is ready to sort out all kinds of tricky problems. From machine code to midi, communications to compilers. Whatever your question our team will find the answer.

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A You can use the ((C)) command which won't do quad sized text but does all the useful things like colour and font settings.

Star colour

Those readers who have, or are thinking of purchasing a colour printer similar to the Star LC-10 reviewed in your July issue, may be interested in the way in which the printer can be told to print colour without affecting the format.

I use a Citizen HQP-40 printer fitted with the colour option and the Scribble! word processor. The Epson JX-80 printer option is used from Preferences, with colour chosen from the graphics page of course.

Firstly, define the control codes at the start of your document with the dot commands like this:

.#0/0=%27[30m (sets the foreground colour to BLACK)
.#1/0=%27[31m (sets the foreground colour to ORANGE)
.#2/0=%27[32m (sets the foreground colour to GREEN)
.#3/0=%27[33m (sets the foreground colour to YELLOW)
.#4/0=%27[34m (sets the foreground colour to PURPLE)
.#5/0=%27[35m (sets the foreground colour to RED)
.#6/0=%27[36m (sets the foreground colour to CYAN)

When you want to change the colour of your test just press LEFT AMIGA + G and you will get a little box with a c in it. Follow this with a number for the colour you want 0 to 6. The printer will keep printing in the colour of the last command until you tell it otherwise.

If you have a different word processor to Scribble! you may have to set the escape code differently, but you should be able to work out what you need.

John Farrar, Cornwall.

Musical muses

Q *I bought my A500 some six months ago, along with a monitor, second drive, and printer, which of course made a considerable hole in my bank balance. I had intentions at the time of adding a Midi interface once the finances had a chance to right themselves.*

That time has now happily arrived, but I find myself increasingly confused as to how to go about building a system which will interface a fairly cheap (under £300) synth to the Amiga, enable the Amiga to be used as a digital "tape" recorder for keyboarded music in real time, and store music constructed with a 'construction set' type program.

I also want to be able to edit this data, in a reasonably user-friendly way for storage and playback.

M J Elliot, Lowestoft.

A Datel (0782 744707) offers the best value Midi box, while Triangle Television (01-887 1726) has the best selection of music programs. We think you will be surprised to find that the software is more expensive than the hardware.

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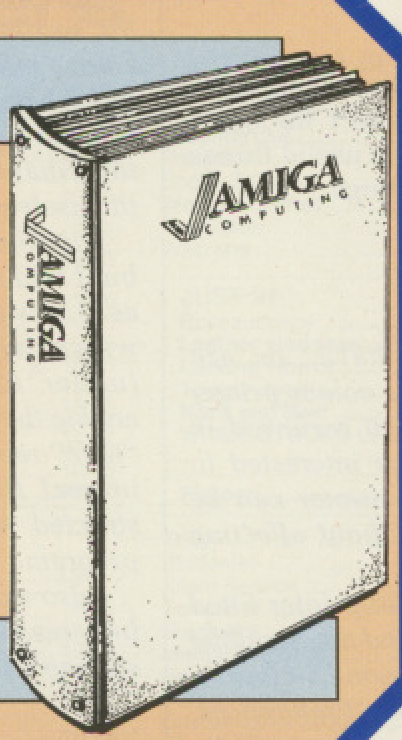
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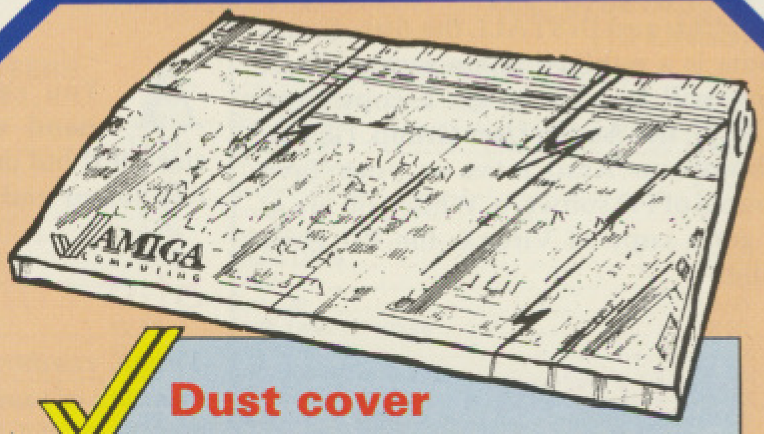
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Guru's haunt

SITTING next to the processor inside your Amiga is a 256k rom. In the days of yore when there were eight bits to a bus this was a lotta lotta memory. Now things are a shade bigger and fitting an operating system – or at least *most* of an operating system, because much of the Amiga's code is in the libraries on the Workbench disc – into such an area is a squeeze. The programmers got so tight on space that they waited until the beginning of the next month to save a byte in the date string.

* * *

PIRACY is a problem. The demise of one large team of hackers may reduce the number of pirated copies but it is really a moral judgement. A bit like saying that your town would be easier to drive through if no one parked on yellow lines, yet everyone does it.

We've never seen the effects of actually getting people to stop parking on yellow lines, but the benefits of killing piracy were made clear when Electronic Art's Interceptor was launched in June. The week before Interceptor came out the Amiga had 1.6 per cent of the Gallup's chart. (The ST had 4.4 per cent.)

When Interceptor hit the shelves it grew to 2.5 per cent. This remarkable increase promoted the Amiga from being the market number eight to number five.

Interceptor was not pirated. The codewheel and good security at Electronic Arts helped, and the result was that a lot of copies were sold. The more often this happens the more likely software houses are to put the effort into producing really good programs.

It is no good saying that people bought Interceptor because it was good. If they could have pirated a copy they would have done so. As it is, games players ordered the game when the local shop ran out of copies.

This Christmas is going to be very important for the Amiga. If we buy a lot of games, more will be written for the machine in the future. Rip off the software houses, and we kill our Amigo.

ADVERTISERS' INDEX

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